CX – 21

BIOLOGICAL ASSESSMENT FOR

SUCTION DREDGING ON USFS- and BLM-MANAGED LANDS ON THE SOUTH FORK

CLEARWATER RIVER

Bull trout - *Salvelinus confluentus*
Snake River fall Chinook salmon - *Oncorhynchus tshawytscha*
Snake River steelhead trout - *Oncorhynchus mykiss*
Canada lynx - *Lynx canadensis*
MacFarlanes's Four-O'Clock – *Mirabilis macfarlanei*
Spalding's catchfly – *Silene spaldingii*
Whitebark Pine – *Pinus albicaulis*

U.S. Forest Service
Nez Perce-Clearwater National Forests
Kamiah, Idaho

Bureau of Land Management
Coeur d'Alene District, Cottonwood Field Office
Cottonwood, Idaho

Prepared and Approved By:

Daniel R. Kenney **Date:** April 6, 2016
Daniel R. Kenney
NPCNF North Zone Fisheries Biologist

Craig A. Johnson **Date:** April 6, 2016
Craig A. Johnson
Cottonwood Field Office Fisheries Biologist

Section I. Introduction

This biological assessment (BA) addresses potential effects to designated Threatened and Endangered Species from proposed suction dredging activities during the 2016 through 2025 mining seasons within a specified area of the mainstem of the South Fork Clearwater River (SFCR). This document also addresses Essential Fish Habitat (EFH), in accordance with applicable requirements of section 305(b) of the Magnuson-Stevens Act and it implementing regulations, 50 CFR Part 600.920.

All sites would occur within the Clearwater or Red River Districts, Nez Perce-Clearwater National Forests (Forests) or on land managed by the Bureau of Land Management's Cottonwood Field Office (BLM). The project area legal descriptions are several sections in the Boise Meridian from T30N, R3 and 4E upstream through T29N, R3, 4, and 5; T28N, R5 and 6, and then back into T29N, R6 and 7 and 8 (Figures 1a, 1b, 2a, 2b). The potential project sites would be located in the mainstem of SFCR within Idaho County, Idaho, from the Harpster bridge upstream approximately 47 miles to the origin of the SFCR at the confluence of the American and Red rivers, with the majority of the project river reach passing though lands managed by the Forests and through private inholdings within the Forests boundary, except in T29, R8, which primarily flows through BLM and private lands.

The Endangered Species Act (ESA) of 1973 directs Federal agencies to conserve Endangered and Threatened Species and to ensure that Federal actions authorized, funded, and carried out are not likely to jeopardize their continued existence or result in the destruction or adverse modification of critical habitat. In response to Section 7(c) of the Endangered Species Act and Forest Service Manual (FSM) 2670, this BA displays the potential effects of up to fifteen suction dredging operations upon Threatened, Endangered, Proposed and Candidate Species that are known or may occur in the area. The analysis area used to evaluate effects of the proposed project includes the watersheds listed above.

The USFWS' IPaC online program, when accessed on March 11, 2016, lists for Idaho County seven listed, proposed, or candidate species: Canada lynx, northern Idaho ground squirrel, bull trout, MacFarlane's four-o'clock, Spalding's catchfly, and whitebark pine. No evidence exists that any other listed, proposed, or candidate species may occur in the project area.

IPaC also states the presence of Snake River steelhead trout critical habitat, but does not mention the presence of ESA-listed individuals which are administered by NOAA Fisheries (NMFS); the NMFS does not provide routine county- or Forest-specific ESA-relevant species lists. The NMFS does show maps on its website that includes Snake River steelhead and Snake River fall Chinook salmon as present within portions of the Clearwater River basin.

Table 1 lists each of the ESA-status species. For each species, this table provides information on occurrence, habitat, whether the species is considered in detail, and an effects determination. The primary references for information on species not considered in detail is the Idaho Conservation Data Center (ICDC, now IFWIS, Idaho Department of Fish and Game (IDFG) 2014). Those species for which more detail is provided are signified by a bolded effects determination, and the text description for that species is provided in Section VI.

Section II. Background Information

Under the 1872 Mining Law, mineral prospecting and extraction are permitted on Federal public lands. These lands are now administered primarily by the U.S. Forest Service and BLM, and while our agencies have the ability and obligation to condition mining operations to minimize effects on other public values and resources, we do not have the ability to deny these operations. In addition, overly restrictive conditions on mining operations can be interpreted as denial of mining rights, so the Forests and BLM recognize that there will be unavoidable modifications of stream channels that are inherently associated with the proposed suction dredge mining.

Species	Status*	Considered in Detail?	Effects Determination**	Rationale
Bull trout *Salvelinus confluentus*	T	Yes	**NLAA**	Native and present in the Clearwater River and some of its tributaries (USFWS 2002) with 5 populations nominally present in the SFCR subbasin; the mainstem SFCR is serves as migratory and fluvial rearing habitat for these populations, but habitat conditions during the dredging season are marginal to poor, primarily because of high water temperatures. A few rearing or adult and subadult are likely present in the project area during the proposed dredging season, but because of project design and mitigation measures, effects on individuals should be discountable or insignificant.
Bull trout Critical Habitat (CH)	n/a	Yes	**NLAA**	Mainstem of the SFCR and mainstem Clearwater River are CH as FMO (foraging, migration, and overwintering habitat), but effects would be discountable or insignificant.
Snake River steelhead trout *Oncorhynchus mykiss gairdneri*	T	Yes	**LAA**	Native to the SFCR drainage and present in the SFCR project reach as fry and juveniles during the dredging season.
Steelhead Critical Habitat	n/a	Yes	**LAA**	Designated in SFCR project reach, and downstream and upstream of project reach, and in some tributaries
Snake River fall Chinook salmon *Oncorhynchus tshawytcha*	T	Yes	**NLAA**	Native to Clearwater basin and recently shown to construct redds in the SFCR within the project area, but the presence of adults, spawning, incubation, and fry emergence would be outside of dredging season. Dredging areas would be left in a condition that would not affect attract or affect spawning.
Fall Chinook Critical Habitat	n/a	Yes	**NE**	Designated CH does not extend into the SFCR, ending in the mainstem Clearwater River about 20 miles downstream from the mouth of the SFCR and about 35 miles downstream from the lower boundary of the project area.
Canada lynx (*Lynx canadensis*)	T	No	**NE**	Uses mature forests for denning and early seral stages (especially dense lodgepole pine) for foraging; snowshoe hares primary prey. Modeled suitable habitat does not occur in project area, and stray individuals would not be affected by activities.
MacFarlane's four-o'clock *Mirabilis macfarlanei*	T	No	NE	Individuals of this species are found only in low elevation grass and shrublands on warm aspects; only in the Snake and Salmon River canyons (Colket et. al 2006).
Northern Idaho ground squirrel *Urocitellus brunneus*	T	No	NE	While IPaC includes this species in the ESA list for Idaho County, the accompanying description clearly states that populations are present only in Adams and Valley counties.
Spalding's catchfly *Silene spaldingii*	T	No	NE	Individuals of this species are found in rich, relatively mesic fescue grasslands and associated open forest and shrublands; in Idaho County it is found in canyon grasslands (Colket et. al 2006).
Whitebark pine *Pinus albicaulis*	C	No	NE	Typically found in Idaho on high elevation ridges; present on Clearwater N.F., but generally not below about 7,000 feet above msl.

Table 1. ESA-listed Species Considered and Effects Determinations
***Status Abbreviations:** T = ESA Threatened, P = ESA Proposed, C = ESA Candidate
****Threatened and Candidate Species Determination:** NE = No Effect; NLAA = Not Likely to Adversely Affect; LAA = Likely to Adversely Affect.
Species with bolded Effects Determinations are further discussed in Section VI text.

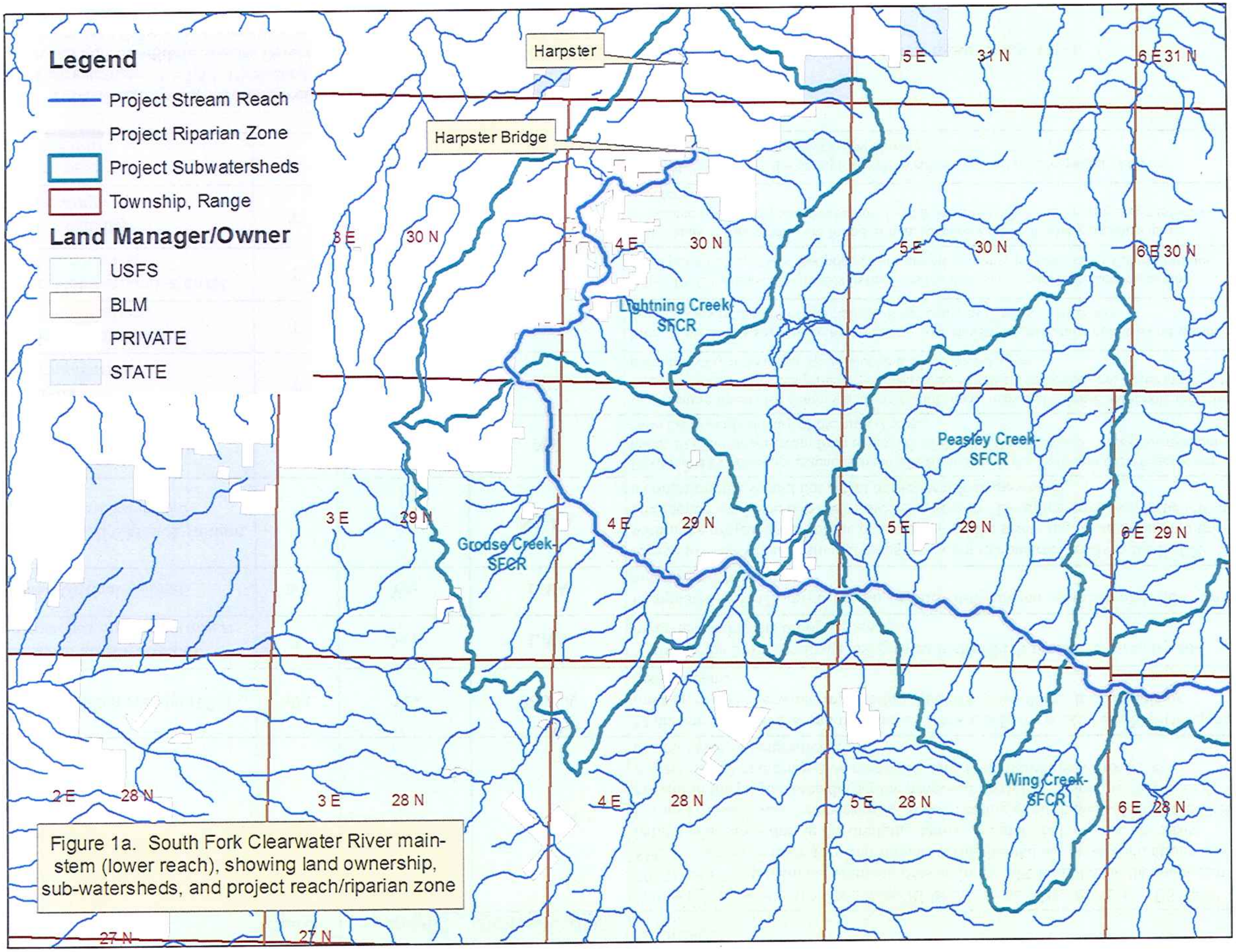


Figure 1a. South Fork Clearwater River main-stem (lower reach), showing land ownership, sub-watersheds, and project reach/riparian zone

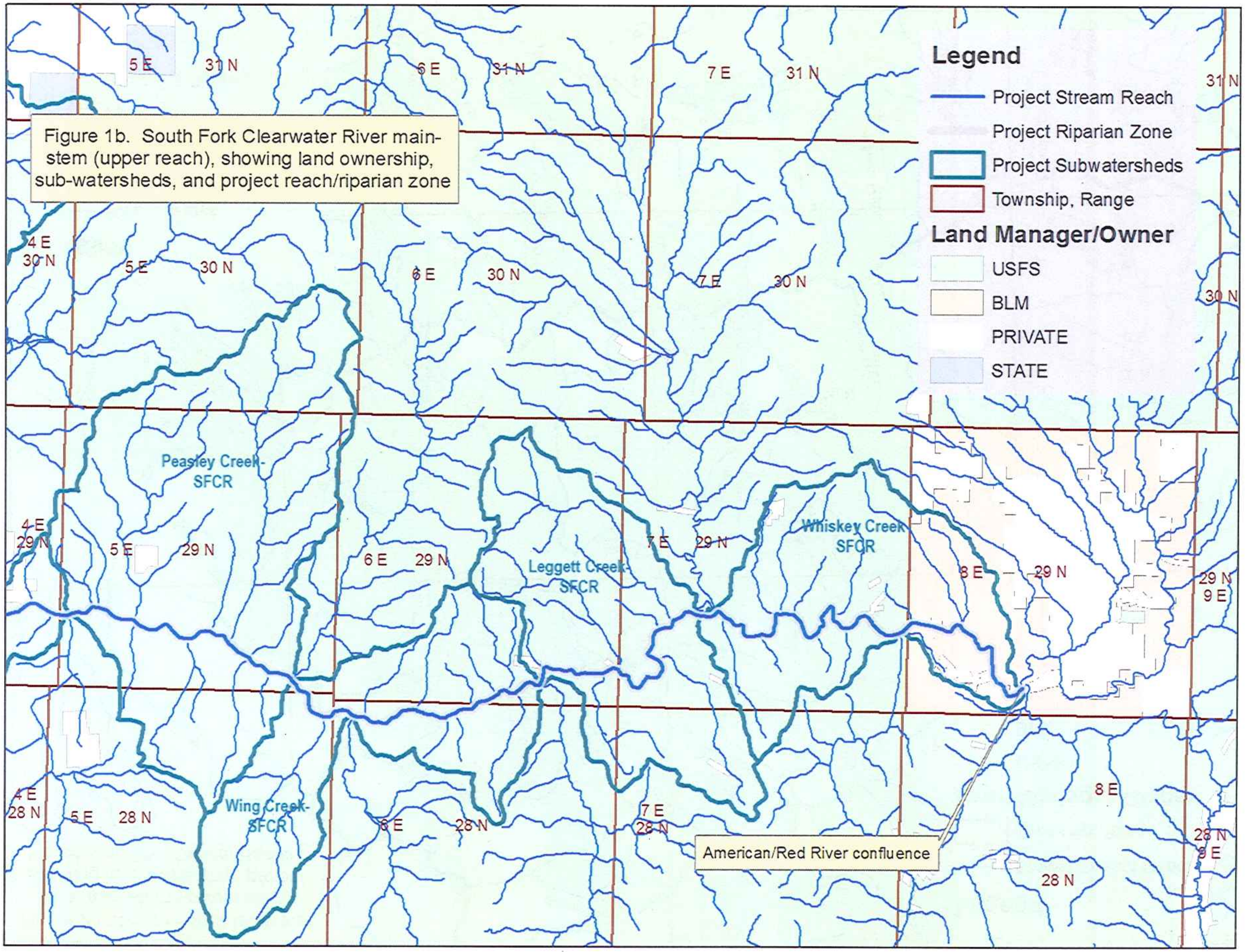


Figure 1b. South Fork Clearwater River mainstem (upper reach), showing land ownership, sub-watersheds, and project reach/riparian zone

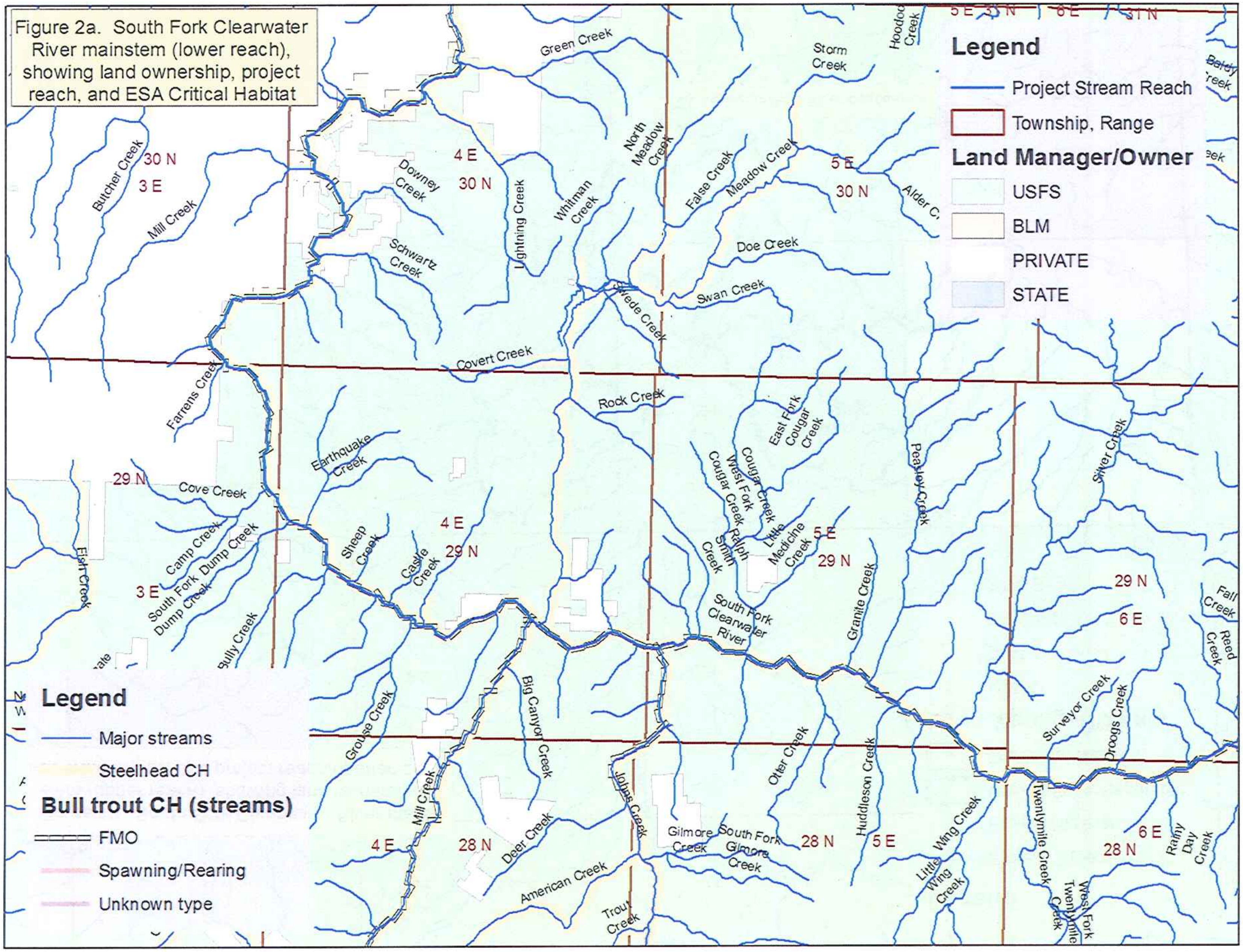
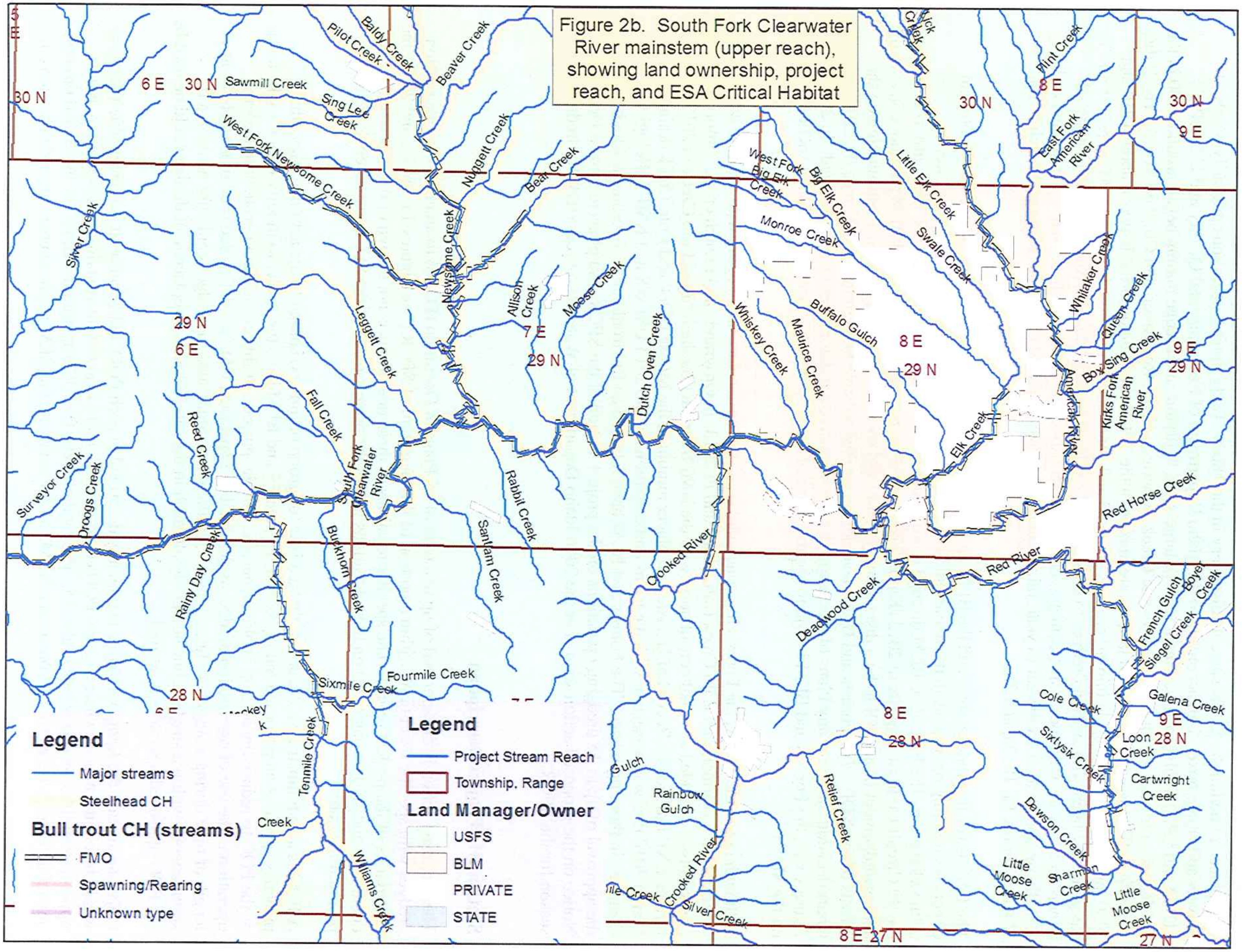


Figure 2a. South Fork Clearwater River mainstem (lower reach), showing land ownership, project reach, and ESA Critical Habitat

Figure 2b. South Fork Clearwater River mainstem (upper reach), showing land ownership, project reach, and ESA Critical Habitat



CX_001134

The SFCR is a major tributary of the mainstem Clearwater River and forms the latter stream with the confluence of the Middle Fork Clearwater River just downstream of the town of Kooskia in north-central Idaho. Gold has been placer-mined in the SFCR since its discovery in the 1860s. Early mining operations primarily involved shovels and sluice boxes, but, according to the Idaho Department of Environmental Quality and U.S. EPA's (IDEQ and EPA) Subbasin Assessment (2003), large-scale hydraulic and dredge mining began around 1900 in the SFCR and its tributaries (primarily Newsome Creek, American River, Red River, and Crooked River). The IDEQ and EPA (2003) noted that a lull in large-scale mining in the SFCR drainage occurred between about 1910 and 1930, but in 1930, large-scale mining projects resumed and continued through the late 1950s. More recent mining has generally been with suction dredges to prospect and explore instream gravels. Suction dredges allowed miners to excavate and process instream gravels that previously could not be reached. While the numbers who actually prospect varies from year to year, miners currently have 24 placer claims on the project reach of the SFCR (Figures 1a, 1b, 2a, and 2b).

The Forests (or its predecessors) and the BLM have not previously conducted ESA consultation on potential effects of dredging operations in the mainstem SFCR. This is because any previous operations were acknowledged by the Forests or BLM through a procedure known as a Notice of Intent (NOI). Until a decision by the 9th Circuit Court of Appeals in 2012 (Karuk Tribe v USFS), the Forest Service (and BLM) did not consider the acknowledgement of an NOI to be a discretionary action and so did not conduct Section 7 consultation on the effects of the NOIs. The Forests and BLM have not acknowledged any NOIs in the SFCR since the 2012 Appeals Court decision, nor have any Plans of Operation (a more-intensive regulatory step) been approved. In 2016 and future years, the Forests and BLM intend to require Plans of Operation (POOs) from prospective suction dredgers on the SFCR.

Although not in the SFCR, the Forests has concluded consultations on suction dredging with the USFWS in 2012 (Moose Creek (formal) and Lolo Creek (informal)) and in 2013 (in Orogrande and French creeks (informal). The Forests also concluded a formal consultation with the NMFS for suction dredging in Lolo Creek in 2013. The former CNF produced a Record of Decision on placer mining in the Moose Creek and Lolo Creek drainages in March 2010 that was consistent with the terms and conditions of the 2013 USFWS and NMFS Biological Opinions in those drainages. The Forests and BLM have released an Environmental Assessment which addresses the approval of up to 15 dredging operations on the project section of the SFCR, and plans to issue a Decision Notice on the proposed action soon after the 2016 Idaho Department of Water Resources (IDWR) dredging season for the SFCR.

Section III. Project Description

The proposed action is the approval of up to a total of 15 Plans of Operation (POOs) to annually operate suction dredges with specific conditions within a portion of the mainstem of SFCR (See Figures 1a, 1b, 2a, and 2b for the boundaries of the project reach). The specific locations of these operations is not known or described in this document, and so the constraints on these locations within the project reach of the SFCR are herein described programmatically.

A POO is an administrative document that a miner (or group of miners) submit to the action agency which provides specifics on proposed mining operations; the FS and BLM have the ability to modify or add to the terms of the POO to reduce impacts on public resources. For the purpose of this consultation, a suction dredging operation is the use of one suction dredge, as descibed in a specific POO, in a delineated dredging reach for any length of time during a single dredging season. While two or more suction dredges could not be operated simultaneous within a single delineated dredging reach in the same season, a replacement dredge could be used by the POO-approved operators if desired.

Only one suction dredging operation is typically described in each POO, but because it is conceivable that there would be circumstances where a single POO could describe more than one suction dredging operation, but the upper annual limit on operations is also 15. The total of up to 15 POOs/operations would be distributed through annual agreement between the Forests and BLM, so, for example, the BLM might oversee up to 4 operations in

2016, and the Forests up to 11 in the same year. A general analysis of these proposed actions was developed in documents (for suction dredging in the Moose and Lolo Creek project areas, but directly applicable for the SFCR project): the CNF's August 2009 Draft Supplemental Environmental Impact Statement (EIS, USDA FS 2009), the March 2010 Final Supplemental EIS and Record of Decision (USDA FS 2010, 2010a). As noted above, an EA has been distributed for operation of up to 15 dredge operations annually in the SFCR.

The SFCR stream reach which would potentially be affected by the proposed action (as shown in Figures 1a-2b) begins approximately 1.8 miles upstream of the town of Harpster (at about river mile (RM) 15.5), and about 0.1 miles upstream from the Forests' administrative boundary at the Harpster Bridge. This bridge elevates Idaho Highway 13 above the river channel and is also at the point where Green Creek enters the SFCR. The project reach continues upstream on the SFCR mainstem approximately 47 miles to the confluence of the American and Red rivers (which is also the origin of the SFCR) at about RM 62.5 (these stream reach distances are based on RMs recorded on USGS 7 ½' quadrangle maps, Figures 1a-2b, Table 2). Recent non-approved dredging in the SFCR seems to be concentrated between highway mile markers 39 and 41 (just downstream of the Elk City township; Dan Kenney, personal observation) but the locations of future proposed dredging reaches cannot be accurately forecast.

Within the ~47 mile project reach, the Forests manage land through which about 36 miles of the SFCR flows, while the BLM manages about 4.4 miles, of which about 2.7 miles is within the township which includes Elk City (T29N, R8E). Within the full project reach are private parcels through which about 6.4 miles of the SFCR flow. Riparian areas in proximity to SFCR (approximately 3,500 acres of default RHCA, less that on private ground) also have the potential to be affected by activities (such as camping and vehicle access) associated with proposed suction dredge operation. Idaho Highway 14 (and about 0.4 miles of Idaho Highway 13) parallel the entire project reach, usually within 100 feet of the active stream channel.

An operation, for the purpose of this BA, is considered by the Forests and the BLM to consist of one suction dredge being used within the SFCR project area during the mining season. A POO submitted to and approved by the Forests or BLM may describe an operation as being performed by one or more individuals at one or more locations on one to 32 days within the July 15-August 15 season. Although some miners dispute the legal ability of the Forest Service or BLM to regulate mining on unpatented mining claims, our agencies consider the submittal of a POO to be a necessary step in suction dredging within the portions of the SFCR which flow through Federal land. Also, an "operation" under this consultation is not synonymous with an unpatented mining claim under the 1872 Mining Law, nor is a mining claim a prerequisite for approval of a POO.

The mining operations proposed for approval in the SFCR would involve processing instream sand, gravel, and cobble primarily with suction dredges, although non-powered panning and sluicing within the bank-full channel may also occur at the dredging sites because the Forest Service and BLM generally consider these activities to be outside of our legal purview (i.e., they are not Section 7 "actions.") While potential and recent mining claims and activities have been located in SFCR drainage streams other than the mainstem of SFCR, this BA also only analyzes the effects of instream mining in the specified reach of the SFCR. The Forests or BLM will not approve a POO for suction dredging on the SFCR unless the operator had received coverage for its discharge under the Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) program. The current NPDES general suction dredging permit, approved in April 2013, limits suction dredging in the SFCR to no more than 15 operations (with a minimum active operational spacing of 800 feet) and limits these operations to the SFCR reach described in this BA. The general NPDES is also not valid without completion of ESA consultation by the Forests and/or BLM, and so this consultation is intended to both satisfy the Forests' and BLM's ESA Section 7 requirements and to allow NPDES general permit issuance to miners by the EPA.

The Forests and BLM anticipates receiving several Notices of Intent (NOIs) or POOs for the 2016 mining season (again, July 15-August 15), but as of early May 2016, there were 24 current placer mining claims in the mainstem of the SFCR within the analysis area (Figure 2), and many of these claims are owned by more than one individual. It seems reasonable for the Forests and BLM to anticipate that many of the claimants or their representatives (and possibly individuals not associated with any claim) will seek to suction dredge in the project area, such that the maximum of 15 operations analyzed under this consultation may be sought in 2016.

Some of the mining claim/operation names and likely locations in the SFCR drainage are suspected but the proposed operators and operations in 2016 and future years are not yet known. The number of days of dredging and calculated likely length and volume of dredged areas are therefore also currently unknown. Relatively recent documents dealing with suction dredging in the SFCR (DeRito 2000; Stewart and Sharp 2003) do not record the size of the dredging operations, but some of these sorts of records do exist for Lolo Creek (on the Lochsa District of the Forests) operations.

So, using the Lolo Creek data as a guideline for potential activities on the SFCR, during the Lolo Creek 1998 dredge season suction dredges were operated three to five hours per day on average, four days per week. Based on this and similar information, the 2009-2010 Lolo Creek suction dredging BA (CNF 2008) estimated the amount of stream channel that would be dredged at about 3,600 linear feet. If all 15 operations on the SFCR that could be permitted were extended to the greatest individual length estimated in in the 2009-2010 Lolo BA (345 feet, CNF 2009), the total length dredged in 2015 and each future year would be about 5,175 feet over a stream reach of about 40 miles (i.e., <3% of the linear analysis reach).

As more-recent comparisons, the 2013 Moose Creek consultation (with the U.S. Fish and Wildlife Service on a stream in the North Fork Clearwater drainage) authorized operations on up to about 12% of linear stream channel (about 0.06% of the total linear stream channel in the project area was actually dredged in each of 2013 and 2014, with about 0.02% dredged in 2015), while the 2013 Lolo Creek consultation (NMFS 2013) authorized up to about 9% of the project area linear stream channel, with the only dredging so far (in 2015) equal to about 0.01% of the total project area linear stream channel.

A more direct method of estimating the maximum amount of stream bottom disturbance associated with the proposed action is to employ the implications of Mitigation Measure D.3., which limits each operation on the SFCR to about 90 linear meters (~300 feet). If 15 operations were to each dredge a full 300 linear feet of stream channel, the total linear distance dredged each year under the proposed action could be up to about 4,500 feet. This figure is very likely a substantial overestimation of the distance that would actually be dredged under approved POOs, but is offered here as an upper bound.

Because the width of SFCR varies throughout the project reach and some sections of the SFCR would have a greater proportion of dredgeable area than others, the Forests and BLM propose to measure potential impact of the operations by area rather than linear distance. Mean wetted width in the SFCR project area during the summer is approximately 67 feet (Dobos 2015). The 2009-2010 Lolo BA assumed 6 feet of channel disturbance width per linear foot, but is a smaller stream than the SFCR, so the Forests and BLM propose using twice this standard width, 4,500 linear feet x 12 lateral feet = 54,000 ft^2 as the approximate maximum disturbance allowed annually (Table 2). Over the 10-year program term, cumulative disturbance among years will not exceed an average annual rate of 0.2%, which will be accrued and reported after years 3, 6, and 9 of the program.

Table 2. Comparison of proposed 2015-24 suction dredging area to total stream lengths and area.

Stream	Total linear stream distance in feet (miles)	Total project stream area in feet^2	Maximum total area proposed annually for dredging in feet^2	Maximum proportion of area proposed annually for dredging
SFCR (mainstem w/in project area)	211,200 (40)	~14,150,400	Up to ~54,000	~0.4%

Small-scale suction dredging involves an operator partially or fully immersed in a stream channel manipulating the dredge nozzle and moving cobble by hand, and so is relatively arduous and tiring work. As an approximation, during the 2013 dredge season on Moose Creek, the sole operator averaged four to five hours per day, three to four days per week in the five weeks he dredged (Kenney 2013); the effort on this operation in 2014 was similar (Kenney 2014). Effort at the 2014 level was a little less than 20% of daylight hours in a week, and the Forests and BLM expect that most suction dredge operators will actually dredge at this level of intensity for no more than half of the 4 ½ week IDWR season; the Forests bases this expectation on the documented dredging effort on Lolo Creek in the 2001 season, which averaged about 14 days among each of the 8 operators (NPCNF 2013, Appendix 2).

In Idaho, the Idaho Department of Water Resources (IDWR) regulates modifications to stream channels under Idaho Administrative Procedures Act (IDAPA) Rule 37.03.07, with specific rules for suction dredging under Rule 37.03.07.064. The IDWR typically annually develops a self-issued "recreational" mining "letter permit" with specific conditions and prohibitions, and in 2015 and several earlier years included the subject reach of the SFCR under this permit (www.idwr.idaho.gov/streams/recreational-mining-permits.html, Appendix C) In 2016, however the IDWR developed a "Special Supplement" to its Recreational Mining permit for the subject SFCR reach in order to align that agencies permit requirements with those developed by the Forests, BLM, and EPA (also Appendix C). Many of the conditions and prohibitions in the IDWR "Special Supplement" permit are essentially the same as the mitigation measures in this document and, crucially, the IDWR will permit only 15 dredge miners for the subject reach. While not requiring Forests, BLM, or EPA approval in the "Special Supplement" permit, the IDWR has been otherwise cooperating with these agencies to regulate SFCR dredging, and emphasizes that each miner will be subject to Forests/BLM POOs and to EPA NPDES permitting.

This BA includes specific conditions regarding mitigation measures, monitoring, and reporting for proposed suction dredge mining; these conditions are listed in Section IV (below). Notably, one of the mitigation measures is the contingency of POO approval on obtaining IDWR and EPA permitting and on compliance with the permit conditions of these agencies.

In the application of mitigation measures described in the next section, the Forests or BLM do not propose to completely exclude miners from dredging in extended (150 foot or more) stream reaches, but rather to delineate specific areas within the proposed dredging operation sites as suitable or not based on stream channel morphology, substrate size, or other biologically relevant conditions. After this habitat delineation by Forests or BLM biologists, but prior to the mining season, a field review would be arranged by the Forests and BLM for the Streamlined Consultation Level 1 Team members to ensure that the areas proposed by the operators and Forests/BLM staff for suction dredging within the operation sites have been delineated in a manner that will have minimum effects to listed species (steelhead, fall Chinook salmon, and bull trout) and EFH-relevant species (spring Chinook and coho salmon) during the 2015 and future seasons.

The Forests and BLM will obtain, or require operators to obtain, all necessary Clear Water Act permits for the proposed activities, and intends that this BA should be sufficient to meet the Section 7 requirements of the Corps of Engineers, the EPA (for the General NPDES permit) and any other Federal agency. The Forests and BLM will allow the EPA to sign on as a cooperating agency for this consultation.

Section IV. Mitigation and Monitoring

As directed by Section 7 (a) (1) of the ESA, the Forests and BLM propose to implement the following mitigation and conservation measures in 2016 and future years to minimize or avoid adverse effects of the proposed suction dredging activities on steelhead trout, fall Chinook salmon, and bull trout populations and habitat. These measures also include a means to gather additional information about aquatic habitat conditions for future consultation efforts. Several monitoring and restorative actions were identified as necessary to minimize effects to fish and aquatic habitats in the Moose and Lolo Creek consultations by the Level 1 Team in previous years; both modified versions of the Moose/Lolo measures and some specifically crafted for the SFCR are proposed here.

A. Mining Operations

The act of placer mining inherently modifies some portion of the stream channel or riparian zone, because substrate, sediment, or soil is moved from one place to another and sorted. As described above, the FS or BLM do not have the authority to deny this basic activity, but do have the ability to place conditions on the methods, timing, and (to some extent) location of this movement and sorting. Site-specific operating conditions, design features, terms and conditions, and mitigation measures which are required, as applicable, for mining operations and associated activities covered by this consultation include:

1. The relevant Forest/BLM Field Office will require each operator to sign a written statement listing and accepting all mitigation and terms and conditions as part of their NOI/POO prior to acknowledging/ approving implementation of their placer mining operation. The operator would also be required to provide the Forest and BLM a description of the specific location(s) of the operation within the delineated operating reach, the surface areas and estimated volume of substrate dredged/disturbed, the number of days/hours per day operated, length/breadth of maximum turbidity plume each day, any sightings of ESA-listed species, and descriptions of unusual events. Field forms will be provided to each operator to facilitate recording of this information

2. Suction dredging operations will occur only within the wetted perimeter below the ordinary high water line during an IDWR dredge season, and activities which would expand the wetted perimeter (such as streambank alteration) would not be permitted.

3. Prior to dredging or other "may affect" activities, operators must meet with the relevant FS/BLM unit fisheries biologist and/or other relevant staff who will inspect the proposed operation sites. No dredging or other movement or modification of substrate will be allowed in localized areas where ESA-listed salmonids are known to spawn or otherwise concentrate or in likely spawning/early rearing habitat. Miners will also be required to avoid known localized, preferred, and uncommon habitat of salmonid fry, Pacific lamprey larvae, and western pearlshell mussel, including low-velocity backwaters, alcoves, and side channels (as indicated by clay, silt, or sand substrate). The areas that would be required to be avoided during dredging reach delineation would be specific locations within the proposed operation areas rather than extensive stream reaches.

4. Suction dredges will have a nozzle diameter of 5 inches or less and a horsepower rating of 15 horsepower or less.

5. Pump intakes (but not dredge nozzles) must be covered with 3/32" mesh screen or other appropriate size.

6. Dredging operations and other instream activities must take place only during daylight hours.

7. Any cobble or small boulders moved from their initial location in the channel (in order to reach bedrock) would be repositioned into its approximate original configuration in elevation and stream channel morphology and all dredge or other spoil piles must be dispersed by the end of the dredging season. In particular, the operator will not move cobbles or small boulders in the stream course to the extent that substantial alterations of the deepest and fastest portion of the stream channel (i.e., the thalweg) persist beyond the end of the dredging season.

8. Operations must not constrict or dam the stream channel or otherwise cause a potential structural barrier to upstream or downstream fish movement; any such substrate arrangements must be dispersed on a daily basis. Dredged or other excavated holes must be backfilled before any new dredge holes are excavated.

   Dredging would be excluded from mainstem SFCR areas within 15 feet laterally and 30 feet downstream of fish-bearing tributary mouths, and daily operations would not be permitted to hinder fish access to fish-bearing tributary mouths through disturbance, turbidity, or modifications of channel depth or substrate arrangement.

   For the five SFCR tributaries known or thought to currently support bull trout spawning/rearing (Johns Creek, Tenmile Creek, Newsome Creek, Crooked River, and Red River) and for American River, dredging would be excluded within 50 feet laterally (up to half the width of the SFCR), and 50 feet upstream and 150 feet downstream of the tributary mouths.

If miners desire to dredge between 150 and 300 feet downstream of the tributary mouths specifically named above (and on the tributary entrance side of the river), FS/BLM biologists would survey stream habitat quality in these areas prior to delineation of dredging reaches. Based on the combination of tributary "plumes" and high quality stream habitat type (in the form of substantial pools, LWD and boulder cover, etc.) FS/BLM and Level 1 Team biologists would then come to agreement on whether and where additional exclusion areas should be recognized during dredging reach delineation.

9. Per IDWR "letter permit" instructions, dredges must not operate in the gravel bar areas at the tails of pools. Dredges or other types of operation cannot be conducted in such a way that fine sediment (sand or silt) covers portions of gravel bars to a depth of more than 0.5 inch, but fine sediment mixed as a minority component with larger substrate is acceptable.

10. Dredging or other mining activities will not occur in the wetted channel within 2 feet of stream banks. Operators must prevent the undercutting and destabilization of stream banks and woody debris or boulders that extend from the bank into the channel and may not otherwise disturb streambanks. If streambanks are inadvertently disturbed in any way, they must be restored to the original contour and re-vegetated with native species at the end of the operating season.

11. Dredges and sluices must not operate in such a way that the current or the discharge from the sluice is directed into the bank in a way that causes disturbance to the bank and associated habitat, deposits sediment against the bank, causes erosion or destruction of the natural form of the channel, undercuts the bank, or widens the channel.

12. Operators may not remove, relocate, break apart, or lessen the stability of substantial in-channel woody debris or instream boulders (>12 inches median diameter). unless it was determined by the appropriate Forests/BLM minerals and fisheries staff that such wood or substrate particles are common enough that re-arrangement would not affect habitat availability or FS/BLM staff agree that the wood or boulder can be temporarily moved, but re-installed at the same location and elevation by the end of the operating season. The operator will not remove any large down or standing woody debris or trees for firewood within 150 feet of the stream.

13. Operators must visually monitor the stream for 150 feet downstream of the dredging or sluicing operation (this is a condition of the general NPDES permit). If noticeable turbidity is observed downstream, the operation must cease immediately or decrease in intensity until no increase in turbidity is observed 150 feet downstream.

14. No mechanized equipment will be operated below the mean high water mark except for the suction dredge, sluice, or pump itself and any life support system necessary to operate a suction dredge. No mechanized equipment will be used for conducting operations, including, unless specifically acknowledged or approved in an NOI or POO.

15. Operators must maintain a minimum spacing of at least 800 linear feet of stream channel between active mining operations (i.e., any operating within the same year), or the minimum distance between suction dredges required by the relevant NPDES general permit (whichever is greater).

16. To avoid reducing the quality of critical migratory and holding habitat for adult listed salmonids (as determined by the the appropriate Forests/BLM minerals and fisheries staff and discussed with the Level 1 team), operators will be required to avoid operating dredges within 150 linear feet upstream and 50 feet downstream of the highest quality pool within each ¼ mile of the relevant stream channel so that adult bull trout and other salmonids seeking cover and thermal refuge are not disturbed and so that a turbidity plume produced by the dredge does not reduce water quality or deposit sediment in the pool.

17. The suction dredge and other motorized equipment must be checked for leaks, and all leaks repaired, prior to the start of operations each day. The fuel container used for refueling equipment within the active stream channel must contain less fuel than the amount needed to fill the tank. Unless the dredge or other

motorized equipment has a detachable fuel tank, operators may transfer no more than one gallon of fuel at a time during refilling. Operators must use a funnel while pouring, and place an absorbent material such as a towel under the fuel tank to catch any spillage from refueling operations. A spill kit must be available in case of accidental spills. Soil contaminated by spilled petroleum products, must be excavated to the depth of saturation and removed from Federal lands for proper disposal.

18. Except for the 1-gallon or smaller contained used for frequent refueling of the dredge or other equipment, gasoline and other petroleum products must be stored in spill-proof containers at least 100 feet from any stream channel and at a location that minimizes the opportunity for accidental spillage to reach the a stream channel.

19. Operators will not entrain, mobilize, or disperse any mercury discovered during mining operations. Operators must cease operations and notify the FS/BLM if mercury is encountered in dredged material. Operators must not use mercury, cyanide, or any other hazardous or refined substance to recover or concentrate gold.

20. Mining operations must shut down immediately if any sick, injured, or dead specimen of a threatened or endangered species is found within 100 linear stream feet of a dredge operation, and the operator must notify the appropriate Forests/BLM minerals and fisheries staff member within 24 hours of the sighting or discovery of an ESA-listed individual in any condition. The relevant FS/BLM unit would contact the Level 1 Team or FWS Division of Law Enforcement at (208) 378-5333 for the discovery of any dead or moribund individual of an ESA-listed species. Operators and FWS/BLM staff must record the date, time, and location of the sighting or discovery, and, if practical, the cause of fish injury or death. A temporary suspension of operations will allow the FWS/NMFS to investigate whether any take of ESA-listed species is related to suction dredging operations, and whether any modifications of operations is necessary to minimize take.

21. Operators must also comply with all additional conditions or measures stipulated in all necessary permits

22. To prevent the threat of aquatic invasive species, suction dredges, tools used while dredging, and associated equipment must be thoroughly cleaned and dried at least 5 days prior to use on National Forests or BLM-managed land.

B. Mining-Associated Activities

Mining operation sites are typically remote from residential areas, so many operators will need to establish camping and equipment/supply sites in relatively close proximity to the proposed mining site. Camp site, staging areas, and access routes will be proposed by the miner and approved by the the appropriate Forests/BLM minerals and fisheries staff /Level 1 team in order to minimize disturbance, reduce impacts to riparian vegetation, minimize the potential erosion into stream channels, and minimize the potential for toxic or sanitary contamination of operational areas.

Site specificity and the level of protection necessary will be evaluated by the FS/BLM fisheries and minerals staff and will take into account, but may not be limited to the following; presence of listed species, flow regime, floodplain width, riparian characteristics, stream size, and valley shape.

1. Boundaries of camping, equipment and materials storage areas, locations where motorized vehicle use is authorized, and other locations where impacts might be anticipated will be designated and recorded by the the appropriate Forests/BLM minerals and fisheries staff and described in the pre-project checklist (C.5., below, and Appendix F). Because of the close proximity of many roads and dispersed campsites to stream channels, these proposed camping and activity sites will often be within RHCA default buffers, so the presence of the RHCA is not, in and of itself, a reason to disapprove a miner's proposed site.

2. Existing disturbed areas, such as existing dispersed campsites, road pull-offs, and prisms, will be utilized whenever possible for miner camping and equipment/supply storage, and areas of minimally sufficient size could be cleared outside of default RHCAs if staging or stockpile areas do not exist.

3. Camping areas, paths, and other disturbed sites that are located within RHCAs and that are created or expanded by mining operations or associated activities must be re-vegetated or otherwise restored to their pre-project condition at the end of the mining season.

4. All human waste and gray water must be kept more than 200 feet away from any live water, unless deposited in an appropriate Forests/BLM waste disposal facility. All refuse from dredging activities must be packed out and disposed of properly.

5. Proposed motorized vehicle access to mining sites via roads or trails not currently open to the general public must be detailed in NOIs or POOs, but the FS or BLM will not allow or approve the construction of any new roads or trails. The Forests/BLM may allow motor vehicle access necesssary for transportation of equipment or temporary housing on existing roads/trails which are closed to the general public, but only such access that is possible through hand brushing or light road surface maintenance/repair. Any brushing, repair, or maintenance proposed by the claimant that would occur within any RHCA or which has the potential to transmit sediment to stream channels must be specifically approved by the the appropriate Forests/BLM minerals and fisheries staff and Level 1 team and would be inspected by the Forest and BLM during the dredging season.

6. Operators must cease impactive activities during wet periods when project activities are causing excessive ground disturbance (visible ground disturbance due to soil saturation) or excessive damage (muddying/rutting) to roads.

C. Permitting and NOI/POO Processing

Prospective placer miners on FS-managed public land are required to submit an NOI if they believe that their proposed operation might cause a "significant disturbance of surface resources" and a POO is required if the FS concludes that "significant disturbance" is a likely outcome. For BLM managed land, a POO is required for any proposed operations in any waters known to contain Federally proposed or listed threatened or endangered species or their proposed or designated critical habitat (CH). In order to allow the proposed operation to conform with NEPA guidance and the conditions of this consultation, the FS or BLM will:

1. Require the prospective miner to provide sufficient information (in the form of a complete NOI or POO application) to allow the appropriate FS or BLM unit to determine whether the proposed operation has the potential to affect individuals of an ESA-listed species and, if so, whether the proposed operation is potentially consistent with this BA. In particular, the mining must specify the location, approximate amount of surface area they plan to dredge, and likely dates of operation as well as any operating conditions, design features, and mitigation measures proposed.

2. To facilitate the processing of NOI/POO submissions, the appropriate Forests/BLM minerals and fisheries staff for each FS/BLM unit would develop and publicize, with the input of the relevant Level 1 team, its proposed schedule for submission of NOIs or POO applications. The application for a proposed operation would be submitted on a schedule that will allow the Forests/BLM staff and Level 1 team sufficient time to review and suggest modifications to the operation to ensure that effects to ESA-listed species are minimized, but the NOI/POO application must be made at least 2 months prior to the beginning of the IDWR dredge mining season for the relevant proposed operating site. The information in a NOI/POO application will be used to delineate operational reaches, establish appropriate monitoring protocols, and determine appropriate mitigation measures, and is not intended to constrain the timing and location of operations.

3. Require the prospective miner to demonstrate the actual or likely relevant permission/approval of the IDWR, US EPA, and IDEQ of their proposed mining operations, and agree to adhere to the relevant

requirements/terms/conditions of this permission/approval prior to POO approval/NOI acknowledgment. To the extent that conditions for a specific activity conflict among the agency rules (e.g., dredge spacing), the most stringent condition would be applied to the POO approval/NOI acknowledgment.

4. If the rules or conditions associated with the relevant IDWR/EPA/IDEQ permits are modified in a manner which could affect ESA-listed species in manner or magnitude not anticipated in this consultation, the FS/BLM will reinitiate consultation with the NMFS and/or FWS.

5. Each of the appropriate Forests/BLM minerals and fisheries staff will provide the local Level 1 team with a completed pre-project checklist (Appendix F) for each proposed mining operation no later than one month prior to the proposed commencement of each operation. The pre-project checklist will describe mining site locations, operational timing, and operational methods proposed in the POOs/NOIs (and potentially modified, with the consent of the prospective miner, to ensure consistency with the consultation conditions).

6. After review of each pre-project checklist (Appendix F), the Level 1 Team may suggest additions or modifications of operation-specific mitigation measures necessary to ensure that anticipated effects to ESA-listed species or CH are no greater than anticipated in this consultation. These additions or modifications will be made a condition of the relevant POO, assuming they are consistent with FS/BLM interpretation of regulatory authority.

D. Mining Monitoring and Reporting

To ensure that SFCR mining operations are conducted in a manner consistent with the operational conditions associated with the consultation, Forests/BLM will be required to conduct some level of implementation and effectiveness monitoring. In addition, the FS/BLM unit will be required to communicate the results of this monitoring to the Level 1 team, FWS/NMFS staff, and other appropriate agencies and entities.

1. Annually, the Level 1 team, after reviewing each pre-project checklist (Appendix F) and considering the likelihood of effect on ESA-listed species and CH and the staffing and other resources available to the Forests/BLM unit, will determine in discussion with the relevant the appropriate Forests/BLM minerals and fisheries staff the appropriate type and amount of monitoring and reporting necessary for each mining operation and for the FS/BLM unit as a whole.

2. As minimum annual site preparation and monitoring activities by the FS for each mining operation, the the appropriate Forests/BLM minerals and fisheries staff or other FS/BLM unit staff will fully delineate (by 15-m reach), photograph, and sketch suction dredging or other placer mining sections after receiving Level 1 team approval of the pre-project checklist (Appendix F). The photographs and sketches would clearly document the condition of the active channel of each operational site at the upper and lower boundaries of the delineated site, and at at least three cross sections within or in proximity to the site which are likely to be modified by the mining operation.

3. The initial maximum length of a delineated mining operation site will be 45 meters (3 reaches or ~150 feet). To the extent that the miner demonstrates that a site is of an insufficient size for the operation the appropriate Forests/BLM minerals and fisheries staff may add additional reaches up to a maximum site length of 90 meters per season. (If the miner proposes to mine more than 90 linear meters of the SFCR in a season, then this programmatic consultation would not be valid and individual consultation for the operation would be required).

4. The appropriate Forests/BLM minerals and fisheries staff or FS/BLM staff will coordinate closely with operators to either conduct full site delineation and any additional pre-project data collection prior to initiation of placer mining at the site or to initially direct operators to specific areas within their dredging sections that would have little or no potential for direct effects on individual ESA-listed fish or enduring habitat effects. The appropriate Forests/BLM minerals and fisheries staff would also be required to make site visits at all active mining operations during the dredging season to record site information and ensure

that miners are complying with NOI/POO conditions. The frequency of these visits would be determined by the Level 1 team, and could depend on the scale of the operation, sensitivity of the operation site, perceived discrepencies between action agency observations and miner reporting, local density of operations, or other logistical, physical, or biological reasons; a minimum of weekly action agency inspections would be the default frequency.

5. The specifics of any additional operation site monitoring will vary with each FS/BLM unit with the location, number, and likelihood of effect of individual mining operations, as well as FS/BLM staff and resources availability and would be determined in discussions between the appropriate Forests/BLM minerals and fisheries staff and Level 1 Team. Common additional monitoring procedures at placer mining sites could include documentation of potential changes in channel morphology, turbidity, or riparian condition as a result of mining, and spawning or fish presence surveys. Common channel morphology monitoring protocols at the mining site and/or in the pool/riffle sequences immediately upstream and downstream from the mined area, before and after mining: (1) Cobble embeddedness estimates and Wolman pebble counts (or other substrate categorization/enumeration methods) at appropriate cross-sections; (2) channel elevation cross-sections; and (3) a longitudinal elevation profile in the stream thalweg. The timing of the pre- or intra-season data full delineation/data collection will depend on streamflow levels, operator readiness, and Forests/BLM staff availability, and may not begin until after the commencement of the IDWR suction dredging season.

6. A post-project monitoring visit of each mining site would also be annually required of the FS/BLM unit within 1 month of the end of the IDWR dredging season. At a minimum, post-project photographs would be sufficient in location and number to allow the FS/BLM unit to document any substantial changes in stream channel and riparian conditions when compared with pre-project photos. In particular, project area modifications which are likely to persist into the next steelhead spawning season should be noted.

7. With timing determined by the Level 1 team (but typically early in the dredging season) an interagency field trip will be held annually to review one or more mining operations on each FS/BML unit (ideally with the permitted miners present) to inform Level 1 team discussions and determine if any additional mitigation or monitoring measures would be needed to minimize impacts to listed species. In addition to the Level 1 team members, representatives from the IDFG, IDWR, Tribes, and other interested parties would be invited to attend.

8. With timing determined by the Level 1 team (but typically no later than November 30 of each calendar year) each FS/BLM unit with active placer mining operations covered by this programmatic consultation will provide annual draft post-project checklists (Appendix F) to the relevant Level 1 team and to the State NMFS/FWS office. A final version of these checklists, with any requested supplemental information, would be provided to the Level 1 team and State NMFS/FWS office by December 31 of each year that dredging occurs that describes operator compliance with suction dredging rules, the amount of stream area mined at each site, relevant photos of the mining sites, details about stream bank disturbance and re-vegetation other types of persistent alterations, if any.

9. In particular, as supplemental information provided with the annual checklists, the FS and BLM units will coordinate and calculate the total stream channel area dredged each year and cumulatively under this consultation. Cumulative disturbance area must not exceed an annualized rate of 0.2% of the calculated area of the project reach for a period longer than two consecutive years or as an annual average by program's end.

E. Enforcement of Forest Service and BLM Mining Regulations

This Biological Assessment has been developed to complement a NEPA document in development by the Forests and BLM that will identify and analyze the effects of the BA-specified level and type of suction dredging in the SFCR; POOs would be authorized by Forests/BLM decision document that would follow from the NEPA document. In 2015 (and to some extent in several previous years) suction dredgers operated in the SFCR without benefit of a POO, and so without ESA Section 7 scrutiny of the effects of their activities on ESA-listed species.

The development of the NEPA/decision documents and BA necessarily assumes that the Forests/BLM will attempt to block or stop any suction dredging in the SFCR that is not consistent with an approved POO.

1. The Forests and BLM will complete NEPA documentation and decisions in 2016 in a timely and sufficient manner to allow the approval of Plans of Operation which would conform with the terms of this ESA consultation.

2. Concurrent with monitoring of approved-POO miners (See D.4., above), Forests and BLM aquatics/minerals staff will attempt to detect and describe non-approved mining in the SFCR. Any such non-approved mining would be reported to Forests/BLM law enforcement personnel for disposition.

3. The Forests and BLM, with the potential assistance of the NMFS, FWS, EPA, and Idaho Departments of Water Resources and Fish and Game, will take necessary and prudent enforcement actions to block or stop any suction dredging in the SFCR which is not consistent with approved POOs or state permits.

4. As an activity separate from any law enforcement, Forests/BLM aquatics/minerals staff will gather information about the potential effects on ESA-listed individuals and habitat from any non-approved SFCR suction dredging. This information would include photographs, measurements, and qualitative observations of the mining site.

Section V. Existing Condition

As noted above, about 40.4 miles of the SFCR (in an ~47-mile reach) could potentially be suction dredged as a part of the proposed action (Figures 1a-2b). Below the lower boundary of the proposed potential dredging reach, the SFCR flows for about 15.5 miles before joining the Middle Fork Clearwater River to form the mainstem Clearwater River, primarily through privately-owned land and the Nez Perce Indian Reservation. The SFCR drainage area above the lower project boundary is about 869 miles^2, which diminishes to about 253 miles^2 at the upper project boundary. As discussed above, the upper 2.7 miles of the SFCR project reach on public land are within the Elk City township and under BLM management. Figures 3 and 4 show that the project reach of the SFCR flows through 6 subwatersheds, which are overwhelming in public ownership, mostly by the Forests.

The primary land uses in the project area drainages are forestry and recreation, with some cattle grazing and mining. In addition to the town of Elk City, there is also some residential development on the private land within the Elk City township, and on scattered private inholdings (IDEQ and EPA 2003). The SFCR subbasin and project action area are relatively heavily roaded, with Idaho Highway 14 (and a short segment of Highway 13) closely (i.e., typically, but not always, within 25-100 feet) paralleling all of the subject reach of SFCR. Where relatively distant from the highway, the riparian areas along the subject SFCR reach (from an elevation of about 1,600 feet up to about 3,900 feet msl) are predominantly conifers, with bands of riparian woody vegetation of varying widths. The riparian areas between Highway 14 and the SFCR are often primarily rock riprap where the highway is very close to the water, and the IDEQ AND EPA (2003) notes that "riparian vegetation has been severely reduced for the entire length of the mainstem by State Highway 14."

Calculated mean annual streamflow at the bottom and top of the dredging reach is about 1,180 cubic feet per second (cfs) and 335cfs, respectively, while the average of the July and August 50% exceedance streamflows at these points is about 388 and 98 cfs, respectively (StreamStats on-line). Peak flows in the SFCR have recently occurred from mid-April through early June (Appendix B).

The IDEQ and EPA (2003) describe the physical characteristics of the project reach: "The main stem SFCR begins at the confluence of the American River and the Red River. From this point to about Tenmile Creek, the river is relatively low-gradient (C channel) riffle/pool habitat dominated by gravel and cobble substrate. The channel has been altered by dredge mining and the placement of State Highway 14. From Tenmile Creek to Mill Creek *(i.e., to just above the lower end of the project reach)*, the river becomes steeper and more confined with the substrate dominated by boulders and cobbles. The channel type is typically A, B, or G (Rosgen 1994). This is a high-energy reach through which the sediment is readily transported." Also from IDEQ and EPA (2003):

"Cobble embeddedness (40%) is rated low condition for the upper SFCR. Percent surface fines were 12% in the upper SFCR and were rated moderate condition. Percent fines by depth for spawning gravels are rated poor condition for the upper SFCR and 40% were less than 6.3 mm (USFS 1999)." The IDEQ and EPA (2003) measured bankfull width in the mainstem SFCR and determined that the mean width was about 110 feet, with a range from about 60 feet to over 150 feet.

Regarding water temperature for the mainstem SFCR, the IDEQ and EPA (2003) wrote: "Temperature is rated low condition for bull trout and steelhead spawning, rearing, and migration. The highest mean weekly temperature was 26.6 °C (80 °F) at (the Mount Idaho bridge (*near the lower end of the project reach*), and temperatures exceeded 15.5 °C (59.9 °F) during the steelhead spawning interval (USFS 1999). Generally temperatures in the SFCR mainstem are too warm for native fish and temperatures increase after the river leaves the (Forests). Several factors contribute to this temperature increase including stream aspect (north-south), elevation, warmer ambient air temperature, and a high width-to-depth ratio. Data collected in the SFCR between 1991 and 1993 by the (Forests), BLM, and (U.S. Geological Survey) (USFS 1999) show temperatures exceeding levels conducive to Chinook, steelhead/rainbow, cutthroat, and bull trout optimal growth, migration, and survival...data collected by the BLM just upstream of the Crooked River Bridge... (*near the top of the project reach*)... suggest that the temperatures recorded at the Mt. Idaho site are indicative of those found throughout the upper SFCR basin (USFS 1999)." More recently, the NorWeST modeled mean August water temperature for the project reach of the SFCR (http://www.fs.fed.us/rm/boise/AWAE/projects/stream_temperature.shtml), converted to mean weekly maximum temperature (MWMT, Dan Kenney personal communication with Dan Isaak, 11 February 2015) , is, from top to bottom, 23.3 to 25.9°C, which is substantially in excess of suitable for all salmonids.

Additionally, fine-grained water temperature data from a very recent study (Dobos 2015) is similar to that of the NorWeST modelling: peak daily water temperature in the likely most popular reach for suction dredging (between the Crooked River and Newsome Creek confluences) during the proposed dredging season in 2013 and 2014 was, respectively, in excess of 24 and 23°C (Appendix G). Some river sections (in particular, the reach between the Silver and Johns Creek confluences) were somewhat cooler than the upper and lower SFCR reaches, so the mean maximum daily water temperatures for the entire project reach for 2013 and 2014 dredging season period were 22.9 and 22.8°C. The metric used in the Matrix of Pathways and Indicators for bull trout is MWMT; using the same data as above summed over the full project reach between July 15 and August 15, peak MWMT for 2013 was 22.5°C and was as low as 19.7°C. Similar MWMT figures for 2014 were 22.0°C and 20.5°C.

The SFCR Subbasin Assessment and Total Maximum Daily Loads (TMDLs; (IDEQ AND EPA 2003) addresses water quality-limited streams listed under Section 303(d) of the Clean Water Act and listed 13 water bodies within the subbasin as water quality-limited. The mainstem of the SFCR was listed for sediment and water temperature from its mouth upstream to the confluence of Red and American Rivers, and TMDLs were developed for these pollutants (IDEQ and EPA 2003). The sediment TMDL targets a 25 percent reduction in human-caused sediment yield to the SFCR. No specific targets were set for tributaries, but it was recognized that much of the sediment yield reduction would need to take place in the tributaries. The water temperature TMDL calls for canopy density or shade targets on a stream reach basis throughout the subbasin.

The fish community of the SFCR appears to still be dominated by native species, in particular, steelhead/redband rainbow trout (steelhead), spring Chinook salmon, and westslope cutthroat trout (IDEQ and EPA 2003). Native coho salmon and Pacific lamprey exist at low levels in SFCR, and have recently been the subject of reintroduction efforts by the NPT (Everett et al. 2006; Ward et al. 2012). Native fall Chinook salmon have recently begun to increase spawning within the SFCR, and the NPT operates an acclimation facility which releases hatchery-reared juvenile fall Chinook salmon about 7 miles downstream of the lower portion of the project reach (Arnsberg et al. 2015). As discussed in greater detail below, native bull trout are occasionally recorded from the mainstem SFCR, and have spawning and rearing populations in a few tributaries. Native species also present include sculpin, several species of cyprinids, and mountain whitefish. Non-native brook trout are present in several SFCR tributaries (IDEQ and EPA 2003), and likely exist in low levels in the mainstem of SFCR. Western pearlshell mussel is a Forest Service Region 1 "Sensitive" species and is present in the SFCR mainstem and likely in several tributaries.

A more-detailed discussion of SFCR watershed conditions is provided in Appendix D.

Section VI. Endangered Species Act Status Species and EFH

A. ESA-status species

Snake River Basin Steelhead Trout. Background: Steelhead trout in the Snake River basin were listed as threatened under the ESA with an effective listing date of October 17, 1997 (62 FR 43937) and proposed for revision on June 14, 2004, (69 FR 33102). The revised Snake River steelhead ESU proposed for relisting as the Snake River Basin *O. mykiss* ESU, which includes both resident and anadromous forms within the range of the existing steelhead ESU, and also includes the North Fork Clearwater River drainage upstream of Dworshak Dam. The ESA listed status for Snake River Basin steelhead trout was finalized on January 5, 2006 via final rule in the Federal Register (71 FR 834). The final rule was consistent with the initial ruling (August 18, 1997) in that the listed Snake River Basin steelhead ESU included all anadromous forms in the Clearwater River subbasin excluding the resident forms upstream of Dworshak Dam in the North Fork Clearwater River subbasin.

On September 2, 2005, critical habitat (CH) for the Snake River Basin steelhead trout was designated via final rule (70 FR 52630). Streams designated for critical habitat designation are identified in the September 2, 2005 Federal Register by their corresponding fifth-field hydrologic unit codes.

The mainstem of the SFCR has CH designated from its mouth through the length of the project reach (Figures 2a and 2b). Several tributaries of the SFCR, including the American and Red rivers, the SFCR's parent streams, were also designated. Snake River Basin steelhead trout (steelhead) are summer steelhead, as are most inland steelhead, and comprise two groups, A-run and B-run, based on migration timing, ocean-age, and adult size.

Distribution and Biology: Adult steelhead trout generally arrive at the mouth of the Clearwater River from September through November, and migrate to tributary streams from January through May. Spawning occurs from mid-March through early June, on a rising hydrograph and prior to peak stream flows (Thurow 1987; Columbia River DART 2013). Surviving adults typically move downstream toward the Pacific Ocean shortly after spawning.

Within the mainstem of the SFCR, steelhead are thought to migrate to or in proximity to spawning sites starting in February and continuing into May (IDEQ and EPA 2003); spawning could occur during this same period, depending on flow levels, individual instinct, etc. Preliminary radio-telemetry data from the Nez Perce Tribe (Dan Kenney personal communication with Peter Cleary NPT, 15 May 2015) from 2013 and 2014 showed that few tracked steelhead were last detected (and assumed to spawn) upstream from the Newsome Creek confluence with the SFCR (1 of 58 of all tracked steelhead and 1 of 23 non-hatchery origin in 2013, with corresponding numbers for 2014 of 7 of 60 and 0 of 10). As of early April 2015, none of the 120 tracked steelhead in the NPT study had ascended above the Newsome Creek (NPT 2015). The proportion of radio-tagged steelhead ascending into the upper mainstem SFCR was likely somewhat higher a month later (Dan Kenney personal communication with Peter Cleary NPT, 15 May 2015), but this is somewhat speculative.

After reaching spawning grounds, steelhead typically select spawning gravels at the downstream end of pools, in gravels ranging in size from 0.5 to 4.5 inches in diameter (Pauley et al. 1986). These spawning areas must meet species-specific requirements of flow, water quality, substrate size, and groundwater upwelling. Embryo survival and fry emergence depend on substrate conditions (e.g. gravel size, porosity, permeability, and oxygen concentrations), substrate stability during high flows, and water temperatures of 13°C or less. The eggs hatch in about 35-50 days, dependent upon water temperature. The alevins remain in the gravel 2 to 3 weeks until the yolk sac is absorbed, then emerge as fry in late spring, and begin to actively feed; egg to fry survival is usually near 15%. NMFS (2006) analyzed temperature data from Lolo Creek and steelhead emergence timing from applicable studies and found that in typical spring water temperature years, Lolo Creek steelhead trout will start emerging between July 1 and 6 and finish emerging by July 17; SFCR water temperatures are likely higher than those of Lolo Creek on the same date, so emergence from redds in the SFCR should typically be similar or earlier.

Highest rates of mortality typically occur during the fry stage and during the first winter. Snake River Basin steelhead trout usually smolt as 2 or 3 year-olds and migrate to the ocean.

Productive steelhead trout habitat is characterized by complexity, primarily in the form of large and small wood and/or boulders and rock. Juveniles will take advantage of microhabitats to seek refuge from high water velocity and/or temperatures. Juveniles may move around in a basin to take advantage of favorable habitat. Fry prefer protected and complex edge habitat with low velocity (<0.3 ft/s). They are seldom observed in water over 15 inches deep. Summer rearing takes place primarily in the faster parts of small and deep scour pools with some form of surface cover and wood or medium to large substrate (cobble or boulders). Other important habitat components for juveniles are pools with "bubble curtains," undercut/scoured areas, and pocket water in deep riffles and rapids. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Small tributaries and lakes are probably important winter habitat. As juveniles get older, some tend to move downstream to rear in larger tributaries and mainstem rivers.

Redband trout are the non-anadromous form of rainbow trout in the Columbia River Basin west of the Cascade Mountains and, in the SFCR subbasin, have evolved in sympatry with the anadromous population. Resident redband trout are morphologically indistinguishable from juvenile steelhead trout

Presence in the Action Area: Historic steelhead spawning and early rearing habitat in the SFCR subbasin included the lower reaches of mainstem tributaries and their accessible higher order tributaries. The canyon reaches of tributaries such as Johns Creek, Newsome Creek, Tenmile Creek, and Crooked River provided the most optimal spawning and rearing habitat for this species (USDA Forest Service 1998). The American and Red Rivers, along with lower Meadow and Mill Creeks also provided habitat with high potential, although somewhat less than the previously listed areas. The upper reaches of Meadow Creek, Mill Creek, Newsome Creek, Crooked River, Red River, and American River provide moderate habitat potential. The mainstem SFCR also provides spawning habitat, although this habitat was probably not widespread nor randomly distributed and occurred in specific lower gradient reaches, like near the mouth of Johns Creek and near the mouth of Newsome Creek and Crooked River (USDA FS 1998).

Historical and current information regarding the physical and biological characteristics of the SFCR watershed are presented in the *South Fork Clearwater Biological Assessment* (USDA FS 1999). This BA also summarized the overall presence/absence, relative abundance, habitat conditions and current trends for bull trout in the SFCR drainage. The environmental baseline was summarized using the *Matrix of pathways and indicators of watershed conditions adapted for the Clearwater River Subbasin and Lower Salmon River* (Appendix E).

Potential Project Impacts. Potential adverse effects to steelhead can be direct, as in redd disturbance by heavy equipment, or indirect, as in increases in fine sediment due to ground disturbance. For this specific proposed project, activities proposed within the stream channel that have the potential for direct injury to individual steelhead include operation of suction dredges (which can entrain eggs and fish), and changes to stream channel, water quality, and riparian habitat characteristics. The requirements of IDWR and EPA permits, as well as the mitigation and monitoring measures described in this BA, have the potential to substantially reduce impacts on individual eggs, steelhead, and steelhead habitat.

Direct effects. The proposed mining season is July 15 through August 15. As discussed above, adult steelhead are not likely to be present in upper SFCR during this period, while eggs are likely to have hatched and sac fry emerged from redds by the beginning of the season. As described above, however, juvenile steelhead rear in their natal streams (or in suitable lotic habitat connected to natal streams) for at least one year before migrating to the ocean, so it appears likely that juvenile steelhead (both recently-emerged fry and older juveniles) have the potential to exist in proximity to every suction dredging operation during the mining season on the mainstem of the SFCR. As such, all project activities have the potential to directly affect individuals of the species.

There are several proposed activities that could potentially directly affect individual juvenile steelhead. The suction dredges have an intake and a nozzle that draw in water and discharge it over a sluice before discharge below the dredge. Suction dredging appears to have little entrainment-related effect on adult and parr-sized salmonids because these individuals are alert and rapidly mobile and so are capable of avoiding the dredge.

Griffith and Andrews (1981) intentionally passed 20 juvenile brook trout and 10 juvenile rainbow trout through a 2.5" dredge and observed no mortality during the following 48 hours. Harvey (1986) found juvenile rainbow trout observed after passage through a suction dredge showed no immediate ill effects. Entrainment-induced mortality is more pronounced for salmonid sac fry. Griffith and Andrews (1981) reported an 83% mortality rate of sac fry after entrainment. Of all life-stages, un-eyed eggs are probably the most susceptible to damage from entrainment through dredges. Griffith and Andrews (1981) reported 100% mortality of un-eyed cutthroat trout eggs after entrainment. The intake of the dredge would be required to be screened to prevent entrainment and impingement of steelhead fry, but the nozzle could not be screened and so it is possible that fry may be entrained through the dredge.

So, while advanced (1+ and older) juvenile steelhead would not be likely to be entrained by suction dredges and would be likely to survive even if entrained, recently-emerged steelhead fry would be less likely to be able to avoid suction dredge entrainment and could potentially be more vulnerable to injury if entrained. As noted above, mobile fry tend to prefer shallow stream margins where water velocity is low. These areas are most likely to be either excluded from dredging via mitigation and Forests instructions or are generally unlikely to harbor much gold, so few fry are likely to be injured by the proposed activities.

Another mechanism for the potential direct injury or mortality to steelhead would be the transmission of toxic substances (gasoline, oil, grease, etc.) into SFCR from fuel spills or leaky or dirty equipment, or the generation and downstream transmission of very high levels of fine sediment from disturbed streambed or riparian areas (Muck 2010). Because of the Design Features, etc. in Section IV and the large dilution effect of the flow volume of SFCR, contaminants should have little potential to enter SFCR at concentrations that would be harmful to any project area or downstream steelhead that might be present. Fine sediment in SFCR is typically sand and so the generation of directly harmful concentrations of suspended solids or high turbidity should not occur. In addition, dredgers would be required to cease operations if turbidity persists for more than 150 feet below the dredge. Further, SFCR in the project reach is wide enough that individual juvenile steelhead should be easily able to avoid harmful sediment plumes.

Indirect Effects. Potential indirect effects of the proposed activities on steelhead include fine sediment (i.e., silt and sand) disturbance and re-suspension in stream channels, sediment (gravel and larger) disturbance and mobilization within stream channels, changes in water temperature, and changes in channel morphology. Fine sediment, whether transmitted from outside stream channels or mobilized within stream channels, has the potential to decrease steelhead feeding efficiency, decrease spawning and early rearing habitat quality, reduce macroinvertebrate production, fill in pools, modify hydrologic processes, and have other adverse effects on steelhead habitat. Long term effects on instream habitat should be minimal because high instream flows between the annual dredging operations should mobilize sediments so as to "reset" the channel morphology. For this project, the potential and expected changes to habitat indicators during and following the implementation of the project are summarized in Appendix E.

Due to the limited number of dredging operations operating at any one time, the small areas being disturbed, and the mitigation and conservation measures mandated under the permit process, the re-suspension of fine sediment by suction dredging would be localized in the affected stream reaches, would not be measurable in lower SFCR, and would be nonexistent in the mainstem Clearwater River. Suction dredging activities will cause a short-term increase in fine sediment suspended in project area streams but should have minimal effects on juvenile steelhead trout because suspended sediments and turbidity generated by the dredging operations should be evident only immediately downstream of each operation. The SFCR is relatively wide compared to a suction dredging plume, so the highest levels of suspended solids/turbidity should not affect the full width of the stream channel, providing easy avoidance of these plumes by juvenile steelhead. The major effect to steelhead trout during suction dredging would be site-specific displacement during operations and possible delays in fish movement through the dredge area. Proposed mitigation and conservation measures (Section V), especially dredge spacing, will minimize or avoid adverse effects on steelhead.

Fines that would be mobilized in the stream channel would likely stay in place during and for a few weeks or months after the dredging season, because of the annual low-flow period in the SFCR. In the long term (i.e., more than a few months after the mining season), hydrologic events will mobilize deposited fines out of the project area. This mobilization would occur when fines from off-site are already being carried by the creek, so no biologically significant increase in turbidity or fine bedload should occur.

With the exception of very fine sediments (<1 mm) that will float (mostly as turbidity) downstream of each suction dredge, the majority of the fine sediments (<6.4 mm) will be deposited as tailings immediately (within about 10 meters, see Appendix A and Moose/Lolo Creek reports) downstream of the suction dredge. The fine sediments and other larger substrate materials (<~125 mm) processed by the suction dredge will be mixed in the tailing piles. Several mitigation and conservation measures will require the claimants to return the dredging areas to near pre-project condition via re-processing the tailings through the suction dredge or manually placing boulders and tailings back into the depressions caused by dredging. As noted above, high flows (see Appendix B) will re-sort stream substrate such that steelhead spawning areas will likely usually retain no evidence of suction dredging, although depending on year, location, and individual spawn timing, it is possible that some some steelhead may encounter remnants of the previous season's mining efforts. It should be noted, however, that IDWR permit rules and a specific condition of POO approval is that suction dredging is not permitted in gravel bars on pool tailouts, which should minimize the potential for alteration of optimum steelhead spawning habitat.

Another effective provision entails the prohibition of dredging, processing, or other disturbance of stream banks, which avoids the introduction of terrestrial-based sediments in the streams and retains existing stream morphology. Disturbance or movement of substantial woody debris or streamside tree harvest would also be prohibited by the terms of the POO approvals, as would disturbance of significant boulders. Proposed mitigation and conservation measures designed for these suction dredging operations will minimize or avoid adverse effects of the proposed suction dredging activities on steelhead trout populations.

Regarding water temperature, data described above in Section V documents that desired temperatures are currently exceeded in the SFCR during at least some years. The proposed activities should have minimal effect on water temperature because the miners would be prohibited from harming streamside vegetation (i.e., shade) and no other significant source of warming (i.e., dam construction) would be permitted or envisioned.

Summary. Project activities would not benefit steelhead habitat, but project design features, mitigation measures, and associated permit conditions would minimize temporary and short-term sediment transmission and suspension, modifications to stream channel morphology, and effects to stream banks and riparian areas, so potential adverse impacts to SFCR steelhead habitat from projects activities would be minor and temporary. For this project, the potential and expected changes to habitat indicators during and following the implementation of the project are summarized in Appendix E.

In conclusion, while short-term and localized changes in steelhead habitat would occur, potential long-term effects on steelhead habitat have been eliminated or minimized to biological insignificance through project location, design, and the mitigation measures that would be implemented. The timing of the project, as well as specific mitigation measures regarding project implementation and specific identification by the Forests of areas within the SFCR stream channel that would be allowed to be dredged, should eliminate or minimize the potential for individual steelhead to be injured or killed by the proposed activities.

Steelhead Critical Habitat: The designation of all of the SFCR project area as critical steelhead trout habitat requires the Forests to consult with the NOAA Fisheries on any agency action which is likely to result in a may affect determination. Of the six primary constituent elements listed in the proposed rule, three elements pertain to the project area (freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors). The potential impacts for the POO approvals on these three elements are summarized below:

•"*Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning; incubation and larval development.*" As noted in the effects analysis above, the proposed suction dredging activities will have localized noticeable effects, but overall these effects are expected to have minimal impacts to the designated habitat in the SFCR. Due to various mitigation measures, (i.e. PACFISH riparian buffers, negligible disturbance of stream banks, no introduction of sediments from the stream banks or terrestrial sources, avoidance of spawning areas, and timing of instream activities until after fry emergence), no direct impacts to steelhead redds are expected. In addition, several mitigation measures are geared to minimize effects to areas that may have potential substrate for spawning. Besides the guiding measure to avoid spawning areas, substrate materials moved and/or relocated from the streambed during the mining operation will be placed back into the original location. In addition, gravels will not be sorted and deposited in one area; gravels need to be re-distributed with existing larger substrate materials to avoid creating artificial spawning areas.

• *"Freshwater rearing sites with: i. Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; ii. Water quality and forage supporting juvenile development; and iii. Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks."* The changes to the riparian zone along the mainstem SFCR in the project area are considered negligible in relation to the effects on rearing habitat. Some minor trampling of riparian vegetation (via trails) may occur, but these would be infrequent and similar to angler access. No changes in water quantity and floodplain connectivity are expected. As noted above, sediment impacts from suction dredging activities will localized and primarily involve the re-distribution of substrate materials through the re-suspension of sediments already in the stream bottom; additional sediments from the stream banks or terrestrial sources would not be introduced into the stream. Another mitigation measure minimizes the potential of creating artificial spawning gravels by requiring the claimants to not sort and deposit gravels in one area; gravels need to be re-distributed with existing larger substrate materials to avoid creating artificial spawning areas. While some redistribution of substrate materials are expected, several mitigation measures (i.e. provide adequate water depth in the primary stream channel to allow for fish migration, processed gravels will be re-distributed with existing larger substrate materials to avoid creating artificial spawning areas, boulders and large woody debris will be retained in the stream channel) will minimize the effects to instream cover. No changes to streamside cover (i.e. undercut banks, large woody debris along banks and overhanging the stream) should occur.

• *"Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival."* Suction dredging activities will not create any impediments to steelhead trout migration due to the mitigation measures. Although short-term displacement of fish during dredging operations and possible delays in fish movement through the dredge area are expected, the maintenance of stream flows to allow for fish passage is required (i.e., the operations will provide adequate water depth in the primary stream channel to allow for fish migration, no damming, restoration of substrate conditions). No changes in natural cover and shade are expected within the mainstem of the SFCR.

Bull trout– Background. Bull trout were listed as threatened under the Endangered Species Act on June 10, 1998 by the U.S. Fish and Wildlife Service (USFWS, 63 FR 31693). The USFWS designated critical habitat (CH) for Columbia River Basin bull trout on November 17, 2010 (75 FR 63898); this designation includes all of the mainstem of the SFCR and the mainstem Clearwater River ~15.5 miles downstream of the lower boundary of the proposed activities. Designated bull trout CH in the mainstem SFCR and the lower reaches of several SFCR tributaries is foraging, migrating, and overwintering (FMO) habitat, and does not support spawning or early rearing of bull trout (Figures 2a and 2b). The upper reaches of five SFCR tributaries have designated spawning and rearing (SR) or an unknown (UK) type of CH, and therefore may have some potential for bull trout reproduction in these streams.

Historically, reproductive success maintained resident, fluvial and adfluvial populations of bull trout throughout its former range. Causes for decline in the range of bull trout include competition with and predation by non-native fish, overfishing, habitat loss and fragmentation, habitat degradation, and loss of productivity associated with depressed populations of other salmonid fishes. Reproductive success has likely been reduced through competition, predation and/or hybridization with non-native, introduced populations of brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*) and coastal rainbow trout (*O. m. irideus*). Spawning success is very difficult to confirm in much of the bull trout range because a considerable amount of the best remaining habitat occurs in areas difficult to access, numbers of fish are few, and redds are difficult to locate.

Distribution and Life History. Resident, fluvial and adfluvial populations of bull trout were historically distributed throughout the Pacific Northwest in the United States and western Canada. Resident and fluvial populations occurred throughout the Snake River basin including tributaries of the mainstem Clearwater River. Bull trout co-evolved with redband trout (*O. m. gairdneri*), westslope cutthroat trout (*O. clarki lewisi*), Chinook salmon (*O. tshawytscha*), and mountain whitefish (*Prosopium williamsoni*). Recent surveys in the known range of bull trout in Idaho have shown metapopulations in widely scattered segments of river basins (Rieman and McIntyre 1993), as well as in isolated catchments.

In relationship to the proposed action, bull trout presently occur in the Clearwater River drainage, spawn and young rear in tributaries within the North Fork, South Fork, Selway, and Lochsa core areas (USFWS 2015), but the mainstems of these rivers and the lower reaches of many of the tributaries are not considered to be spawning or early (i.e., first year) rearing habitat. The mainstem of most or all of these streams are thought to harbor adult and advanced juvenile fluvial (i.e., large-river dwelling) bull trout year-around and are known to serve as migratory corridors for adult and advanced juvenile fluvial and adfluvial (lake-dwelling) bull trout during the spring and fall. In addition, some subadult fluvial and adfluvial bull trout (typically 175-300 mm in length) are known to "wander" into habitat which may not be suitable for spawning or early rearing (as opposed to migration to or from spawning and/or early rearing habitat) and may exist for short or long periods in streams reaches that otherwise would be unoccupied or used only as a migratory corridor (Personal communication, Bruce Rieman, Fisheries Research Biologist, RMRS). Full-time residents of the tributary streams where fluvial and adfluvial fish spawn and conduct early rearing are the third bull trout life history type known to occur in the Clearwater River drainage.

<u>Presence in Action Area</u>. The project reach of the SFCR is part of the SFCR subbasin. Native fish species in the SFCR drainage (i.e., potentially accessible to the project area) include westslope cutthroat trout, redband rainbow trout (in its anadromous and fluvial/resident forms), spring and fall Chinook salmon (and possibly coho salmon *O. kisutch)*, bull trout, mountain whitefish, suckers (*Catostomus* spp.), sculpin (*Cottus* spp.), and redside shiners (*Richardsonius balteatus*).

Five breeding populations of bull trout occur or recently occurred in the SFCR drainage (USFWS 2015). In its Final Recovery Plan (2015), the USFWS determined that local populations (aka "complexes") of bull trout in the SFCR core area currently exist in the Red River (including Upper and West Fork of South Fork Red River), Crooked River, Newsome Creek, Tenmile Creek, and Johns Creek. Potential local populations (USFWS 2002) include American River, Meadow Creek, and Mill Creek.

The mainstem SFCR provides subadult and adult rearing habitat and foraging, migrating, and overwintering habitat for bull trout, but the current abundance and distribution of bull trout in the core area is considered lower than historic levels, with extremely low incidence of fluvial migratory adults (USFWS 2002). The Idaho Department of Fish and Game (High et al. 2005) summarized 1985-2003 snorkel survey data from 113 sites on the mainstem SFCR and detected subadult or adult bull trout at 12 of these sites (~11%); the average density for bull trout at all of the sites was 0.17 individuals per 100 meters^2, while density at sites where any bull trout were detected was 1.15 individuals per 100 meters^2.

Additionally, Dobos (2015, and personal communication with Dan Kenney) detected 5 bull trout during snorkeling surveys of 63 sites on the SFCR in August 2014 (47 were in the project reach). Four of the bull trout (all apparently subadults between 200 and 250 mm in length) were observed a short distance downstream of the Tenmile Creek confluence, and the fifth (also a subadult) was observed about two miles upstream. As a comparison of density, more than 1,400 juvenile steelhead/rainbow trout were also observed during these surveys.

So, although there appear to be a few adult or subadult bull trout present in the project reach of the SFCR during the proposed suction dredging season, conditions within the mainstem of the SFCR during the generally do not appear to be favorable for this species. In particular, water quality (especially high concentrations of fine sediment and high summer/fall water temperatures) exist within the SFCR mainstem. Nevertheless, the presence of subadult or adult bull trout in a project activity reach (a small proportion of the 40-mile project reach) during the dredging season is possible.

Historical and current information regarding the physical and biological characteristics of the SFCR watershed are presented in the *South Fork Clearwater Biological Assessment* (NPNF 1999). This BA also summarized the overall presence/absence, relative abundance, habitat conditions and current trends for bull trout in the SFCR drainage. The environmental baseline was summarized using the *Matrix of pathways and indicators of watershed conditions adapted for the Clearwater River Subbasin and Lower Salmon River* (Appendix E).

Potential Project Impacts. Potential adverse effects to bull trout can be direct, as in redd disturbance by heavy equipment, or indirect, as in increases in fine sediment due to ground disturbance. No activities are proposed within spawning or early rearing habitat in the proposed action, so proposed activities that have the potential for direct injury to individual migrating or rearing subadult or adult bull trout include operation of suction dredges (which can entrain fish), and changes to stream channel, water quality, and riparian habitat characteristics. The requirements of IDWR and EPA permits, as well as the mitigation and monitoring measures described in Section V, have the potential to substantially reduce impacts on individual bull trout and bull trout habitat.

Direct effects. As discussed above, and based on sampling data, it appears likely that a few bull trout would exist in the SFCR channel in the project stream reach during the suction dredging season, and possible that bull trout would be rearing in or migrating through a suction dredging reach. Any individual adult or subadult bull trout that would exist in the SFCR channel in the project stream reach, and in proximity to a dredging operation during the dredging season could interact with a dredger or dredging operation, so project activities may directly affect individuals of the species, but these individuals are likely to be sparse, as well as alert and highly mobile. As discussed above, daily peak water temperatures in the subject reach of SFCR can exceed the desired rearing temperature of 15°C (75 FR 63898) by mid-July (i.e., the start of the dredging season, IDEQ and EPA 2003), so rearing subadult and adult bull trout in the project area are likely to seek isolated areas of cool water in the mainstem SFCR or seek colder tributaries if they are to thrive or survive.

There are several proposed activities that could potentially directly affect individual adult and subadult bull trout. The suction dredges have an intake and a nozzle that draw in water and discharge it over a sluice before discharge below the dredge. Suction dredging appears to have little entrainment-related effect on adult and parr-sized salmonids because these individuals are alert and rapidly mobile and so are capable of avoiding the dredge. Further, Griffith and Andrews (1981) intentionally passed 20 juvenile brook trout and 10 juvenile rainbow trout through a 2.5" dredge and observed no mortality during the following 48 hours. Harvey (1986) found juvenile rainbow trout observed after passage through a suction dredge showed no immediate ill effects. Entrainment-induced mortality is more pronounced for salmonid sac fry. Griffith and Andrews (1981) reported an 83% mortality rate of sac fry after entrainment. Of all life-stages, un-eyed eggs are probably the most susceptible to damage from entrainment through dredges. Griffith and Andrews (1981) reported 100% mortality of un-eyed cutthroat trout eggs after entrainment. Even though no bull trout eggs or fry would be present in the mainstem SFCR during the dredging season, the intake of the dredge would be required to be screened to prevent entrainment and impingement of any fish.

Any adult or subadult bull trout present in proximity to an operating dredge, but not actually entrained into the dredge would have the potential for disturbance of normal behavior, but there is no reason to suspect that any actual harm would be associated with the operation of a dredge in typical (and delineated) dredging areas. Mitigation measures (A.8., and A.16.) would prevent dredging from occurring in close proximity to the mouths of bull trout spawning tributaries (although only Tenmile Creek appears to be substantially cooler than the mainstem, Dobos 2015) and high quality pools where adult or subadult bull trout might find shelter, and no dredging would be permitted at night, so little delay in upstream or downstream passage of could be caused by the proposed activities.

Another mechanism for the potential direct injury or mortality to bull trout would be the transmission of toxic substances (gasoline, oil, grease, etc.) into the SFCR from fuel spills or leaky or dirty equipment, or the generation and downstream transmission of very high levels of fine sediment from disturbed streambed or riparian areas (Muck 2010). Because of the Design Features, etc. in Section IV and the large dilution effect of the flow volume of SFCR, contaminants should have little potential to enter SFCR at concentrations that would be harmful to any project area or downstream bull trout that might be present. Fine sediment in SFCR is typically sand and so the generation of directly harmful concentrations of suspended solids or high turbidity should not occur. In addition, dredgers would be required to cease operations if turbidity persists for more than 150 feet below the dredge. Further, the SFCR in the project reach is wide enough that individual juvenile bull trout should be easily able to avoid harmful sediment plumes.

Indirect Effects. Potential indirect effects of the proposed activities on bull trout include fine sediment (i.e., silt and sand) disturbance and re-suspension in stream channels, sediment (gravel and larger) disturbance and mobilization within stream channels, changes in water temperature, and changes in channel morphology. Fine sediment, whether transmitted from outside stream channels or mobilized within stream channels, has the potential to decrease bull trout feeding efficiency, decrease spawning and early rearing habitat quality, reduce macroinvertebrate production, fill in pools, modify hydrologic processes, and have other adverse effects on bull trout habitat. Long term effects on instream habitat should be minimal because high instream flows between the annual dredging operations should mobilize sediments so as to "reset" the channel morphology. For this project, the potential and expected changes to habitat indicators during and following the implementation of the project are summarized in Appendix E.

Due to the limited number of dredging operations operating at any one time, the small areas being disturbed, and the mitigation and conservation measures mandated under the permit process, the re-suspension of fine sediment by suction dredging would be localized in the affected stream reach, would not be measurable in the SFCR downstream of the project reach, and would be nonexistent in the Clearwater River. Suction dredging activities will cause a short-term increase in fine sediment suspended in project area streams but should have minimal effects on juvenile bull trout because suspended sediments and turbidity generated by the dredging operations should be evident only immediately downstream of each operation. The SFCR is relatively wide (a mean of 67 feet in the project reach (Dobos 2015)) compared to a typical suction dredging plume (which is limited to 150 feet in length (A.13.), so the highest levels of suspended solids/turbidity should not affect the full width of the stream channel, providing avoidance of these plumes by juvenile bull trout.

In addition, although not as potentially persistent as changes in channel morphology, turbidity is important from a biological perspective because in extreme cases it can substantially reduce sunlight penetration in the water column enough to reduce photosynthesis of benthic algae, which is the food base for many aquatic insects. Extreme levels of suspended sediment have also been shown to adversely affect salmonids by abrading and clogging gills, reducing feeding and growth, and causing avoidance of turbid areas.

Van Nieuwenhuyse and LaPerreire (1986) reported that primary production was reduced to essentially zero during heavy placer mining (with turbidity in the ~2,000 NTU range) in Birch Creek, Alaska, but that substantial primary productivity persisted at moderate levels of turbidity (up to ~170 NTUs) in other streams. In a related study in Birch Creek, Reynolds et al. (1989) found that Arctic grayling avoided the stream. When placed in holding cages for up to 9 days in Birch Creek, grayling suffered chronic gill hyperplasia and hypertrophy, starvation, and slowed maturation, conditions that would cause delayed mortality. Sigler et al. (1984) found that salmonids subjected to continuous exposure of turbidities of 25 NTU grew more slowly than controls. Similarly, Cordone and Kelley (1961) and Crouse et al. (1981) reported reduced growth where sedimentation and turbidity were high.

On the other hand, however, fish were observed feeding in turbid plumes created by suction dredging. Stern (1988) observed young steelhead actively feeding on dislodged invertebrates in turbid dredge plumes, even though clear water was available nearby. Thomas (1985) observed cutthroat trout feeding on insects dislodged during dredging. During underwater snorkeling surveys in Canyon Creek, Hassler et al. (1986) observed rainbow trout and juvenile steelhead congregating and selectively feeding on benthic invertebrates that were displaced during suction dredging. Harvey (1986) noted that turbidity increases of 25 to 30 NTU did not appear to affect rainbow trout feeding activity in Butte Creek. Brusven and Rose (1981) found no effect of increased suspended sediment on feeding by torrent sculpins. Although turbidity and sedimentation may make it more difficult for fish to locate food, these effects may be offset by suction dredging exposing or mobilizing invertebrates, which are then readily consumed by fish.

The major effect to bull trout during suction dredging would be site-specific displacement during operations and possible delays in fish movement through the dredge area. On the other hand the noise and on-site activity of small-scale dredging operations does not appear to substantially displace fish. Harvey (1982) stated that dredging apparently did not affect the in-season distribution of adult rainbow trout in the North Fork American River because the numbers of these fish remained virtually constant irrespective of dredging activity. He found no significant differences in the movement of rainbow trout between un-dredged areas and dredged areas. Increased feeding activity downstream of operating dredges (noted above) would also support Harvey's observations. Proposed mitigation and conservation measures (Section V), especially dredge spacing, will minimize or avoid adverse effects on bull trout.

Fines that would be mobilized in the stream channel would likely stay in place during and for a few weeks or months after the dredging season, because of the annual low-flow period in the SFCR. In the long term (i.e., more than a few months after the mining season), hydrologic events will mobilize deposited fines out of the project area. This mobilization would occur when fines from off-site are already being carried by the river, so no biologically significant increase in turbidity or fine bedload should occur.

With the exception of very fine sediments (<1 mm) that will float (mostly as turbidity) downstream of each suction dredge, the majority of the fine sediments (<6.4 mm) will be deposited as tailings immediately (within about 10 meters, see Appendix A and Moose/Lolo Creek reports) downstream of the suction dredge. The fine sediments and other larger substrate materials (~<125 mm) processed by the suction dredge will be mixed in the tailing piles. Several mitigation and conservation measures will require the claimants to return the dredging areas to near pre-project condition via re-processing the tailings through the suction dredge or manually placing boulders and tailings back into the depressions caused by dredging. As noted above, high flows will re-sort stream substrate such that bull trout rearing or holding areas should retain no evidence of suction dredging after the following spring.

The impacts of dredging on aquatic insect populations and other prey sources for bull trout are a concern because the size and vigor of populations is highly contingent upon food supplies, although the generally unsuitable conditions in the SFCR likely make this factor less important than in some other streams in the Clearwater River basin. Benthic (i.e., stream bottom) invertebrates are affected by placer mining because the process dislodges or displaces individuals from a dredge site, potentially causing direct mortality through dredge entrainment and through modification of habitat conditions at and immediately below the dredge site. Dredging can, at least temporarily, alter the distribution and abundance of some types of aquatic insects by increasing embeddedness of large substrate and by clogging the interstitial spaces of substrate which the insects inhabit (Harvey 1982). Dredging can also cause entrainment-induced mortality and increase the vulnerability of invertebrates to predation (Hassler et al. 1986). The consensus among researchers seems to be that the effects of suction dredging on populations of aquatic insects are highly localized and temporary, especially in streams with highly variable seasonal flows (Hassler et al. 1986, Griffith and Andrews 1981, Harvey et al. 1982, Somer and Hassler 1992, Thomas 1985). Hasler et al. (1986) and Harvey (1986) concluded that the overall impacts of suction dredging on benthic invertebrates were minimal.

Regarding forage fish, the discussion above regarding potential direct effects to bull trout applies—eggs, and sac fry would likely suffer high levels of mortality, but larger individuals would be less-likely to be harmed. With the small total amount of suction dredging proposed for a 47-mile project reach, the high natural mortality associated with most fish populations, and the likelihood that few bull trout would be present in the mainstem SFCR at any time of year, there is no reason to suspect that any likely level of mortality associated with forage fish entrainment would affect bull trout growth or survival.

Another effective provision entails the prohibition of dredging, processing, or other disturbance of stream banks, which avoids the introduction of terrestrial-based sediments in the streams and retains existing stream morphology. Disturbance or movement of substantial woody debris or streamside tree harvest would also be prohibited by the terms of the POO approvals, as would disturbance of significant boulders. Proposed mitigation and conservation measures designed for these suction dredging operations will minimize or avoid adverse effects of the proposed suction dredging activities on bull trout populations.

Regarding water temperature, data described above in Section V documents that desired temperatures are currently exceeded in the SFCR during at least some years. The proposed activities should have minimal effect on water temperature because the miners would be prohibited from harming streamside vegetation (i.e., shade) and no other significant source of warming (i.e., dam construction) would be permitted or envisioned.

Summary. Project activities would not benefit bull trout habitat, but project design features, mitigation measures, and associated permit conditions would minimize temporary and short-term sediment transmission and suspension, modifications to stream channel morphology, and effects to stream banks and riparian areas, so potential adverse impacts to SFCR bull trout habitat from projects activities should be minor and temporary. For this project, the potential and expected changes to habitat indicators during and following the implementation of the project are summarized in Appendix E.

In conclusion, while short-term and localized changes in bull trout habitat would occur, potential long-term effects on bull trout habitat have been eliminated or minimized to biological insignificance through project location, design, and the mitigation measures that would be implemented. Based on sampling and habitat conditions, relative few bull trout are likely to occur in the project stream reaches during the dredging season, so areas affected by dredging would be a tiny proportion of available habitat, and even these areas would retain habitat attributes necessary for bull trout use. A mitigation measure (A.8) would exclude suction dredging from the junctions of specific streams into which adult bull trout would migrate to access spawning areas, and these and other exclusions would provide cool water refugia. Further, the timing of the project, as well as specific identification by the Forests or BLM of areas within the SFCR stream channel that would be allowed to be dredged, should eliminate or minimize the potential for individual bull trout to be injured or killed by the proposed activities to a negligible level.

Bull Trout Critical Habitat: The final rule for bull trout critical habitat (CH) relevant to the proposed action (November 17, 2010, 75 FR 63898) includes the mainstem Clearwater River and SFCR requires the Forest to consult with the USFWS on any agency action which is likely to result in a may affect determination. The Primary Constituent Elements of bull trout CH follow:

1. *Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.* The conservation and mitigation measures will avoid/minimize impacts to spring, seeps, and groundwater sources through protection of riparian areas adjacent to the SFCR which is considered to be part of the SFCR CH. It is likely that hyporheic flow would be encountered by some of the placer miners within the subject stream channels because dredgers would often remove substrate all the way to bedrock. The miners would be required to refill all depressions in alluvium in the stream channel, however, before excavating depression at other locations in the stream channel, so long-term hyporheic flow should not be adversely affected. Because of minimal to no effects in the SFCR CH, no impacts would be transmitted to CH in the SFCR downstream of the project reach or in mainstem of the Clearwater River.

2. *Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including, but not limited to, permanent, partial, intermittent, or seasonal barriers.* Suction dredging activities are expected to have negligible impacts in localized areas regarding effects to migration habitat (see discussion above). The conservation and mitigation measures will minimize impacts to migrating bull trout by limiting the concentration of suction dredges within the project reach of the SFCR CH, and by prohibiting suction dredging in the vicinity of high-quality holding pools and at the mouths of spawning tributaries. There would also be no night operation of suction dredges, so upstream migrating adults should find unhindered passage for most of the diel period. It is possible, however, that in rare circumstances a turbidity plume could coincide with the presence of a bull trout, but the intensity (low) and duration (a few hours, at most) of such turbidity would be unlikely to cause adverse effects.

3. *An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.* Suction dredging activities are expected to have no impacts to terrestrial sources, and negligible impacts except in localized areas and in the short term regarding macroinvertebrates and forage fish (see discussion above). The conservation and mitigation measures (along with the annual hydrologic cycle) are expected to essentially eliminate long-term adverse changes to CH in the SFCR and no impacts would be evident in CH in the SFCR downstream of the project reach and in the mainstem of the Clearwater River.

4. *Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.* Suction dredging activities are expected to have essentially no long-term adverse impacts to this element in the SFCR CH. Although conservation and mitigation measures prohibit stream bank disturbance and movement of large LWD and boulders, dredging is expected to have minimal short-term effects to a few localized pool habitats and substrate conditions which would have minimal to no biologically significant effects and which would be erased with the following spring's high flows. Additionally, transmission of any effects to CH in the SFCR downstream of the project reach and in the mainstem of the Clearwater River should not occur because of the attenuating effects of distance and dilution.

5. *Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.* The suction dredging activities proposed will not alter the streamside shade in the SFCR CH or elsewhere within the SFCR drainage. The conservation and mitigation measures will avoid/minimize impacts to riparian areas and subsequent changes in shade and water temperatures. Further, transmission of any temperature effects to in the SFCR downstream of the project reach and in the mainstem of the Clearwater River should not occur because of the attenuating effects of distance and dilution.

6. *In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.* Even though water temperatures in the SFCR CH would likely make spawning attempt by bull trout futile, the project conservation and mitigation measures are intended to be comprehensive and would also prohibit suction dredging in pool tail-outs and other obvious areas with apparently suitable spawning substrate for westslope cutthroat trout and other salmonid species. Where dredging is allowed, sediment impacts in the SFCR CH will be localized and primarily involve the re-distribution of substrate materials through the re-suspension of sediments already in the stream channel; additional sediments from the stream banks or terrestrial sources would not be introduced into the stream. Nevertheless, surface fine distribution may increase for a few dozen feet below the dredged areas, at least until the next high flow event. Another mitigation measure minimizes the potential of creating artificial spawning gravels by requiring the claimants to not sort and deposit gravels in one area; gravels need to be re-distributed with existing larger substrate materials to avoid creating artificial spawning areas. Other than localized, short-term changes to water quality (turbidity) and substrate conditions (sediment levels) in the vicinity of suction dredging activities, no long-term changes in substrate conditions are expected. Once again, transmission of any effects to CH in the SFCR downstream of the project reach and in the mainstem of the Clearwater River should not occur because of the attenuating effects of distance and dilution, and the these areas downstream of the project reach are also not bull trout spawning habitat.

7. *A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departures from a natural hydrograph.* The hydrograph of the SFCR is un-regulated and natural, except for the effects of roads and timber harvest on water yield and routing. Therefore the SFCR and its tributaries that have or potentially have the ability to support bull trout populations will maintain relatively favorable hydrographs and in any event, the proposed actions would have no effect on flow volume or timing.

8. *Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.* As noted in the effects analysis above, suction dredging effects on water quality in SFCR CH will typically be short term and minimal in scope, although local increases in turbidity and suspended solids will occur. While the proposed activities would have short-term and localized effects on water

quantity which individual bull trout may experience or react to, the conservation and mitigation measures are expected to minimize to biological insignificance any adverse changes to stream habitat conditions, and transmission of any effects to CH in the SFCR downstream of the project reach and in the mainstem of the Clearwater River should not occur because of the attenuating effects of distance and dilution.

9. *Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.* With the exception of a few brook trout and, possibly, a few smallmouth bass, no non-native fish species are known to occur in the project area. The presence of a few individuals of these species in the mainstem of the SFCR should have little to no effect on bull trout survival or reproduction, and in any event, the proposed activities would not promote the survival or increased distribution of these fish.

Fall Chinook salmon. Background: Snake River fall Chinook salmon (fall Chinook) were listed as threatened on April 22, 1992 (57 FR 14653); and the listing was reissued on June 28, 2005 (70 FR 37160). Critical habitat was designated for the ESU on December 28, 1993 (58 FR 68543); in the Clearwater River drainage critical habitat extends up the mainstem Clearwater River to the confluence of Lolo Creek, about 20 miles downstream from the confluence of the SFCR and the Middle Fork Clearwater River.

Distribution, Biology, and Presence in the Project Area: Fall Chinook salmon historically spawned primarily in the mainstem Snake River from Shoshone Falls in southern Idaho downstream in appropriate habitat to locations downstream of the Clearwater River confluence, and in the lower portions of larger tributaries. Since construction of dams on the Snake River, current distribution is more limited, but includes the lower Clearwater River. Primarily because of NPT efforts to expand the spawning habitat of the species through hatchery outplants, spawning has recently been recorded in areas of the Clearwater River basin previously without recorded presence for decades.

Fall Chinook typically spawn in late fall (typically no earlier than late October), and fry emerge in early to mid-spring. Juveniles typically rear for a few weeks or months in proximity to their hatching site, but move downstream during the late spring and summer of their first year of life (as subyearlings) to enter the Pacific Ocean. Based on observations on other local streams and known water temperature condition in the SFCR, juvenile fall Chinook salmon should migrate out of the SFCR by the end of June (Bill Arnsberg, NPT, personal communication). Some juvenile fall Chinook are known to winter in the lower Snake River reservoirs and not enter the ocean until after their first full year of life (as yearlings).

Only recently has documentation of fall Chinook spawning or rearing within the SFCR watershed existed. While the large majority of the fall Chinook spawning in the Clearwater River drainage documented since listing has occurred downstream of the North Fork Clearwater River, recent surveys (Adult Technical Team 2008-2012; Arnsberg, et al. 2012-2016) show that fall Chinook spawn at least sporadically in the area between the North Fork to the SFCR confluence, and beyond the critical habitat area in the Middle Fork, Selway, and South Fork Clearwater rivers. In fact, detections of redds in the SFCR have increased from 0 in 2007 to 119 in 2015.

Specifically, aerial redd surveys for fall Chinook salmon have been conducted from the mouth of the SFCR to about the town of Harpster, about 1.5 miles downstream of the lower boundary of the project reach (at about RM 15.5) for a number of years; the reach of the SFCR above Harpster to the junction of Highway 14 and the Mt. Idaho Grade road (at about RM 24.4) was added in 2015. The largest redd count, in 2015, was a total of 119 redds from just upstream of the SFCR's confluence with the Middle Fork Clearwater River to the Mt. Idaho Grade bridge about 24.4 miles upstream. Nearly half (53) of all of the redds counted in 2015 were between Harpster and the Mt. Idaho Grade road, and so were near or within the proposed SFCR suction dredging reach.

Effects of Proposed Action: Suction dredging and associated activities would be unlikely to cause direct effects to fall Chinook salmon because no individuals of any lifestage should be present in the SFCR within the project reach during the mining period. As described above, fall Chinook salmon would not enter the SFCR until a month or more after the end of the dredging season, so suction dredging would not have any direct effect on individual salmon that might enter the project reach. Young-of-the-year fall Chinook salmon should migrate out of the SFCR by the end of June, and so would not be present in the project reach during the dredging season.

As described in this document for steelhead and bull trout, the potential indirect effects of suction dredging within the project reach of the SFCR primarily involve small changes in substrate conditions and instream cover, turbidity, and suspended sediment levels. These changes could affect spawning and rearing habitat for salmonids, including any fall Chinook present in the SFCR in the months following the dredging season. Any substrate changes and redistribution of fine sediment produced by suction dredging would, however, be localized and should not be measurable in stream reaches immediately downstream of the project area. Changes in water quality conditions may also occur in localized areas during project operations. Although some dredge tailings may superficially appear to be potentially suitable spawning substrate for fall Chinook salmon, miners would be required to ensure that substrate affected by mining is in a condition similar to that of undisturbed adjacent substrate and so should not be substantially more attractive, less stable, or more susceptible to scour or movement during subsequent high flow events. Effects to the project reach of the SFCR, the remainder of the SFCR, and the mainstem Clearwater River would be discountable to nonexistent because of lack of coincidence with active mining and because the quality of spawning habitat should not be affected (see discussions for steelhead trout and bull trout), so biologically significant effects should not be transmitted to individuals or critical habitat in the Clearwater River.

Because fall Chinook salmon spawning distribution has been progressing further upstream in the SFCR during the last few years, the FS/BLM will coordinate with the Nez Perce Tribal and other biologists to document and evaluate the effects of any spatial coincidence of dredging reaches and subsequent salmon spawning locations in the project reach of the SFCR.

Canada lynx. <u>Background.</u> Canada lynx in the contiguous United States were listed as threatened under the ESA in 2000 (65 FR 16052) with critical habitat designated in 2006 (71 FR 66008). The 2007 Northern Rockies Lynx Management Direction (NRLMD) for the Forest Service (USDA FS 2007) applies to mapped lynx habitat on National Forest System land presently occupied by Canada lynx, as defined by the *Amended Lynx Conservation Agreement between the Forest Service and the FWS* (USDA FS and USDI FWS 2006). When National Forests are designing management actions in unoccupied mapped lynx habitat they should consider the lynx direction, especially the direction regarding linkage habitat.

Although portions of the Federally-managed land in proximity to the project area are considered to be secondary lynx habitat, no portions of the FS Ranger Districts or BLM-managed land in the SFCR subbasin are considered occupied habitat, the project area is outside of any Lynx Analysis Unit (LAU) and so there is no modeled lynx habitat in the project area. This is primarily because all of the project area is too low in elevation (i.e., under 4,000 feet msl), and because of the vegetation type of the area.

<u>Direct and Indirect Effects</u>. The IDFG's Animal Conservation Database lists about 20 purported lynx observations within about 20 miles of the project area in the last 40 years, although these visual observations have not been confirmed. Based on these and other relatively recent observations on the Forests, it is possible that individual lynx may occasionally occur in proximity to the project area, but there is no evidence that a breeding population exists here.

Analysis of the effects of the planned actions on Canada lynx habitat indicated the project complies with the NRLMD Record of Decision of March 2007 (USDA FS 2007) in that it would not affect habitat within a lynx habitat analysis unit. In terms of potential effects on lynx, even if the project were within an LAU, there would be no timber harvest and little mature vegetation or woody debris disturbance, so lynx denning or foraging habitat would not be adversely affected.

No change to lynx foraging or denning habitat, prey species, or probability of occurrence would likely occur as a result of the proposed project. While there may be an increase in human activity in the project area for the duration of the project implementation, because the dredging area flows next to a state highway and heavily-used recreation areas any such increase would likely be within the range of annual variation, and it is unlikely that any nominal increase in human activity would be significant in terms of disturbance of any individual lynx in the unlikely of occurrence in or near the project area during the summer-fall implementation period. No snow plowing is being authorized and no snow compacting activities are proposed. No change to migratory or dispersal corridors would occur. In summary, the proposed project should have no biological significance to individual lynx and to lynx habitat.

B. Essential Fish Habitat

In accordance with applicable requirements of section 305(b) of the Magnuson-Stevens Act and its implementing regulations (50 CFR Part 600.920), the Forests and BLM need to evaluate potential effects of the activities proposed under the SFCR suction dredging POO approval project in the SFCR drainage on Essential Fish Habitat (EFH). The SFCR is a tributary of the mainstem Clearwater River.

NOAA Fisheries designates the freshwater habitat of Pacific salmon species by subbasin (i.e., HUC 4). EFH includes all streams and other water bodies occupied or historically accessible to these species (with certain exceptions), but does not otherwise distinguish individual streams within the subbasins. The project would be implemented in the Clearwater subbasin (17060306), where both Chinook (both spring/summer and fall run types) and coho (*O. kisutch*) salmon have (as of December 2014, 79 FR 75449) EFH designated habitat. The project area is historically accessible to both Chinook salmon types.

Spring Chinook salmon in the Snake River are considered an ecologically significant unit (ESU) under the ESA. Spring Chinook salmon in the South Fork Clearwater subbasin, however, are not considered part of this ESU because it is believed that indigenous spring Chinook populations were eliminated from the Clearwater River Basin by construction of Lewiston Dam. Spring Chinook salmon in the Clearwater basin are therefore not listed as threatened as are other spring Chinook in the Snake River basin despite concurrent declines in returning adults. Spring Chinook salmon have been considered as a species of special concern by the State of Idaho and as a sensitive species by Region 1 of the U.S. Forest Service since 1987. Spring Chinook salmon in the SFCR represent an important population, or metapopulation, in the Clearwater River basin. Others occur in the Lochsa and Selway Rivers, Lolo Creek, and in various smaller tributaries to the lower Clearwater River.

The SFCR basin has a very high inherent capability to support spring Chinook salmon, especially upper basin tributaries such as Red River, American River, Newsome Creek, and Crooked River (USDA FS 1998). This is based on features such as climate, elevation, relief, and geology. Currently, two adult spring Chinook salmon traps in the South Fork subbasin itself (located on the Red River and Crooked River) collect adults and eggs, these eggs are reared at the Clearwater Hatchery in Ahsahka and juveniles are released into South Fork tributaries. Some natural spawning of spring Chinook salmon occurs in other SFCR tributaries, with subsequent juvenile rearing (IDEQ and EPA 2003). The mainstem SFCR probably historically supported spawning and rearing of spring Chinook salmon, but currently functions almost exclusively as nodal habitat; that is, it provides adult migration and limited juvenile rearing only, because water temperatures in the mainstem typically exceed acceptable levels for during the late summer spawning period for this species (IDEQ and EPA 2003). The upper SFCR upstream from Crooked River, however, sometimes supports spring Chinook salmon spawning at a low level (Craig Johnson, BLM, personal communication). Overall, spring Chinook salmon spawning is limited as discussed above in the upper SFCR and occurs primarily after August 15. As described in Section V.A., for steelhead, the proposed action would cause short-term turbidity and mobilization of fine sediment in the project reach of SFCR, and would affect the arrangement of larger substrate, but should not adversely affect habitat for this species in the long-term.

The characteristics of and potential effects to Snake River fall Chinook of suction dredging in the SFCR are described above in Section V.A., Snake River fall Chinook salmon typically spawn in larger streams. Spawning has recently been documented in the SFCR, including the project reach of the SFCR (see ESA discussion above), but the degree of reproductive success from this spawning is not known.

Historically, coho most likely inhabited tributaries in the lower Clearwater River Basin including some in the lower SFCR subbasin (Everett et al. 2006). Re-introduction of coho salmon has been undertaken by the Nez Perce Tribe in tributaries of the mainstem and Middle Fork Clearwater River, and the Tribe is planning to re-introduce the species to SFCR tributaries in the future. For now, however, hatchery coho salmon juveniles have primarily been released into Lapwai Creek, Clear Creek, and Orofino Creek. As adults reared in these streams continue to return in larger numbers, so it is possible the some adults (perhaps especially those spawned or released in Clear Creek) may stray into the lower SFCR and successfully spawn there. Similar to spring Chinook salmon (but not fall Chinook salmon), there likely no suitable coho salmon spawning habitat in the mainstem of SFCR (primarily because of high fall water temperatures) and impacts of the proposed project on instream and riparian habitat should be similar to those described above for spring Chinook salmon.

VII. CUMULATIVE EFFECTS

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

As described in Section IV, almost all of the land upstream of the project area is managed by the Forests, with small amounts of BLM-managed and private land. Mostly private, but some State and BLM-managed land is located downstream of the project area within the SFCR drainage, along with a few hundred acres of the Forests. Cumulatively, past land uses within and downstream of the placer mining project area have altered the riparian, stream channel and stream habitat conditions of the fish bearing streams. Stream flows, substrate conditions, summer water temperatures and various habitat conditions have been degraded in various degrees. Further, over the past decades, habitat improvement has been observed in SFCR tributaries as a result of restoration activities on both private and Federal land, involving culvert replacement, stream channel restoration, and riparian planting and fencing (IDEQ and EPA 2003). In general, timber harvest and grazing will continue to occur on private lands in the SFCR watershed; the amount and intensity may vary annually. Continued timber harvest, fuels treatments, cattle grazing, upland mining, recreational use, and road maintenance on Forests- and BLM-managed land within the SFCR drainage and their associated cumulative effects to the aquatic resources were briefly discussed in Section V and Appendix D. The recovery trend regarding the aquatic resources is expected to be a slow process which will occur over many decades, especially regarding improvements to substrate conditions and summer water temperatures. To avoid offsetting this improving trend, the project was designed to avoid or minimize short-term impacts on the aquatic resources.

In 2015, the Forests documented several unauthorized dredging sites, primarily within a ~4 mile reach between the Moose Creek and Crooked River confluences (Hughes 2015, Kenney 2016). Unauthorized dredge mining in the future will likely decline once miners have an opportunity to operate legally, others may be deterred by enforcement activity, and finally, coordination between issuance of Idaho and Federal permits will help clarify who is authorized. Suction dredging in reaches of the SFCR flowing through private land may occur, but this dredging would also be unauthorized (because of the lack of an NPDES permit) unless the U.S. EPA completes consultation with the FWS/NMFS.

The potential impacts from the proposed suction dredging in the SFCR during the 2016 and future mining seasons on the steelhead and bull trout populations in the Clearwater subbasin are expected to be insignificant and discountable. Due to the small scale of the dredging operations, the small areas being disturbed, and the mitigation measures mandated under the permit process, any sediment produced by suction dredging would not be measurable downstream of the project area. Suction dredging changes the mobility of sediment dislodged by the dredge, but it does not add sediments to the stream channel. Since no riparian vegetation or bank alterations should occur with the proposed mining activities, no changes in water temperatures are expected in the SFCR. Therefore, no effect to downstream steelhead or bull trout within the lower SFCR or the mainstem Clearwater River is expected from suction dredging activities within the SFCR project area.

VIII. DETERMINATION AND RATIONALE

A. Endangered Species Act Listed and Candidate Species

Implementation of the proposed action would be **likely to adversely affect Snake River basin steelhead trout**. This determination is based on the conclusion (discussed in Section VI) that individuals of the species may be harmed or harassed by the proposed activities. While individual juvenile steelhead (especially parr) would be common within the project reach and within sections of the delineated dredging sections, suction dredging activities should avoid impacts to adult steelhead, spawning, egg incubation, and fry emergence because dredging operations would occur after July 15 when steelhead fry have emerged from the substrate and before adult presence and spawning in the following year; effects to steelhead eggs and immobile fry should be negligible and discountable. Machinery operation in the SFCR wetted channel has some potential for entrainment of individual juvenile steelhead, however, especially Age 0+ fry, although such entrainment should not injure or kill many of these individuals because areas of preferred habitat for this lifestage would be excluded from dredging. Age 1 and older juvenile steelhead should be able to easily avoid dredge entrainment, and should not be harmed by entrainment even if it occurs. Substantial local turbidity would occasionally be generated during suction dredging operations and substrate would be entrained and moved as a part of the operation. Because of project design, specific location, and mitigation measures, however, substantial lasting adverse effects on water quality or stream channel and riparian conditions should not occur, so habitat for steelhead should be maintained in and downstream of the project area in the long term. As described above, though, short-term (mostly during the dredging season through the next high flow event) effects would he inherent in suction dredge operation, so designated Critical Habitat for steelhead in the SFCR (but not in the mainstem Clearwater River) would **likely be adversely affected** because minor and temporary effects to the Primary Constituent Elements in the SFCR were identified.

Implementation of the proposed action would be **not likely to adversely affect** bull trout. This determination is based on the conclusion (discussed in Section VI) that individuals of the species would not be harmed or harassed by the proposed activities primarily because individual bull trout are likely to be rare in the project area of the SFCR during the mining season, and possibly not present at all in proximity to active suction dredging reaches. Further, if any individuals of these species were to exist in the vicinity of suction dredging operations, they would likely be of a size and condition such that entrainment through a suction dredge would be very unlikely, and there is no evidence to conclude that bull trout in proximity to active suction dredging would be harmed by the activity. Suction dredging would be excluded from the SFCR upstream, downstream, and laterally of the confluences of known bull trout spawning and early rearing streams, and no dredging would occur at night, so detection of or entrance into these tributaries should not be hindered and use of cool-water plumes below these tributaries and other substantial tributaries would be protected. Because of project design and mitigation measures, transmission of contaminants or fine sediment in the vicinity of bull trout or critical habitat in any measureable quantities should not occur; habitat for bull trout will be maintained with essentially no biologically significant impacts. Prey base and reproductive success will not be impacted by the proposed project. Similarly, designated Critical Habitat for bull trout in the SFCR and the mainstem Clearwater River would **not likely be adversely affected** because only minor and temporary effects to the Primary Constituent Elements in SFCR were identified.

Implementation of the proposed action would be **not likely to adversely affect** Snake River fall Chinook salmon. This determination is based on the conclusion (discussed in Section VI) that individuals of the species would not be harmed or harassed by the proposed activities primarily because individual fall Chinook are very unlikely to be present in the project area of the SFCR during the mining season. Further, if any individuals of these species were to exist in the project area, they would likely be of a size and condition such that entrainment through a suction dredge would be unlikely. Transmission of contaminants or fine sediment in the vicinity of fall Chinook salmon in any large quantities should not occur; habitat for fall Chinook salmon will be maintained with essentially no biologically significant impacts. Prey base and reproductive success will not be impacted by the proposed project.

Similarly, designated Critical Habitat for fall Chinook salmon in the mainstem Clearwater River (approximately 35 miles downstream from the project area) would **not be affected** (i.e., an NE determination) because no adverse effects to the Primary Constituent Elements in that stream were identified.

Implementation of the proposed action will have **no effect** on Canada lynx. This determination is based on the conclusion (discussed in Section VI) that individuals of the species and their respective habitats, prey base, or reproductive success would not be impacted by the proposed project.

Implementation of the proposed action would have **no effect** on MacFarlane's four-o'clock, Spalding's catchfly, or whitebark pine. This determination is based on the lack of individuals or potential habitat for these species in the project area.

B. Essential Fish Habitat

There is likely no spring Chinook or coho salmon spawning habitat in the project reach of the SFCR. Spring Chinook salmon spawning has been documented at very low levels in the upper SFCR upstream from Crooked River. Primary spawning activity occurs in tributaries providing suitable habitat (e.g., Red River, American River, Crooked River, and Newsome Creek. Temporary and localized turbidity and sediment increases would be generated below each suction dredging operation in the project area, and some stream substrate would be rearranged, although spawning substrate would not typically be affected. The determination for the POO approval project is that the proposed activities **would adversely affect EFH** for spring Chinook and coho salmon.

IX. LITERATURE CITED (included references in appendices)

Adult Technical Team. 2012. Nez Perce Tribe Nacó'x (Chinook salmon) and Hé̆eyey (steelhead) adult escapement and spawning ground survey. 2011 summary report, April 2012. Nez Perce Tribe, Department of Fisheries Resources Management, Lapwai, ID. 29pp. (earlier reports also cited)

Anonymous. 1980? Analysis of suction dredge mining on Forest stream habitats on the Nezperce National Forest. Report with handwritten notes, 17 pp. (Reference from Appendix A)

Arnsberg, B., P. Groves, F. Mullins, D. Milks. 2016. 2015 Snake River fall Chinook salmon spawning summary. Nez Perce Tribe, Idaho Power Company, U.S. Fish and Wildlife Service, and Washington Department of Fish and Wildlife. January 2016, 6 pp. (earlier reports also cited)

Brusven, M.A. and S.T. Rose. 1981. Influence of substrate composition and suspended sediment on insect predation by the torrent sculpin, *Cottus rhotheus*. Canadian Journal of Fisheries and Aquatic Sciences 38:1444-1448.

Colket, B., S. Cooke, G. Crymes, and M. Mancuso. 2006. Element occurrence review and update for five rare plant species. Idaho Conservation Data Center, Idaho Department of Fish and Game, Boise. 45 pp. plus appendices.

Cannon, D. 1994. Dredge operations on Newsome Creek. January 19, 1994. Draft report attached to e-mail addressed to Nancy Rusho, with attached graphs, 11 pp. (Reference from Appendix A)

Columbia River DART, Columbia Basin Research, University of Washington. (2013). Available from http://www.cbr.washington.edu/dart

Cordone, A.J., and D.W. Kelley. 1961. The influences of inorganic sediment on the aquatic life of streams. California Fish and Game. 47(2):189-223.

Crouse, M.R., C.A. Callahan, K.W. Malueg, and S.E. Dominguez. 1981. Effects of fine sediments on growth of juvenile coho salmon in laboratory streams. Transactions of the American Fisheries Society 110:281-286.

DeRito, J. 2000. Summary Report of the Suction Dredge Monitoring Program: 1995-1999,Nez Perce National Forest. 9 pp. (Also reference from Appendix A)

Dobos, M.E. 2015. Movement, distribution, and resource use of westslope cutthroat trout in the South Fork Clearwater River Basin. Master's Thesis, University of Idaho, Moscow. April 2015. 55 pp + appendices.

Everett, S., C. Beasley, R. Johnson, C. Davenport, R. Larson, and FishPro Division of HDR Engineering, "Nez Perce Tribal Hatchery Project; Coho Salmon Master Plan,Clearwater River Basin", 2003-2004 Annual Report, Project No. 198335000, 134 electronic pages, (BPA Report DOE/BP-00004035-1)

Griffith, J.S. and D.A. Andrews. 1981. Effects of a small suction dredge on fishes and aquatic invertebrates in Idaho streams. North American Journal of Fisheries Management 1:21-28.

Harvey, B.C. 1982. Effects of suction dredge mining on fish and invertebrates in California foothill streams. M.S. Thesis. University of California, Davis. 34 pp. As cited in: Shuler, S. 2001. Golden Sphinx Placer Claim Aquatics Technical Report. Gallatin National Forest, Montana. April 15, 2001. 40 pp.

Harvey, B.C. 1986. Effects of suction gold dredging on fish and invertebrates in two California streams. North American Journal of Fisheries Management 6:401-409.

Harvey, B.C., K. McCleneghan, J.D. Linn, and C.L. Langley. 1982. Some physical and biological effects of suction dredge mining. California Department of Fish and Game Laboratory Report 82-3, Rancho Cordova. As cited in: Shuler, S. 2001. Golden Sphinx Placer Claim Aquatics Technical Report. Gallatin National Forest, Montana. April 15, 2001. 40 pp

Hassler, T.J., W.L. Somer, and G.R. Stern. 1986. Impacts of suction dredge mining on anadromous fish, invertebrates, and habitat in Canyon Creek, California. California Cooperative Fishery Research Unit, Humboldt State University. 125 pp. As cited in: Shuler, S. 2001. Golden Sphinx Placer Claim Aquatics Technical Report. Gallatin National Forest, Montana. April 15, 2001. 40 pp.

High, B., Meyer, K., Schill, D., and Mamer, E. 2005. Bull trout status review and assessment in the state of Idaho. IDFG Report #05-24. Idaho Department of Fish and Game, December 2005. 39 pp + Appendices.

Hughes, C. 2015. Mineral inspection form, Nez Perce-Clearwater National Forests; Project: South Fork Clearwater dredges. July 22, 2015. 22 pp.

Idaho Department of Fish and Game. 2014. Idaho Fish and Wildlife Information System (aka Idaho Conservation Data Center and Natural Heritage Database). GIS dataset on the Clearwater National Forest, received in 2014 and stored at: T:\FS\Reference\GIS\USA_ID\Data\Restricted\NaturalHeritage_Aug2014.

IDEQ and EPA (Idaho Department of Environmental Quality and U.S. EPA). 2003. South Fork Clearwater River subbasin assessment and total maximum daily loads. October 2003. Lewiston and Boise, ID. 303 pp + Appendices. (Also reference from Appendix D)

Kenney, D. 2013. Post-season suction dredging report for Moose Creek project areas. Nez Perce-Clearwater National Forests. December 12, 2013. 6 pp. + Appendices.

Kenney, D. 2014. Post-season suction dredging report for Moose Creek, Lolo Creek, and Orogrande Creek project areas. Nez Perce-Clearwater National Forests. December 31, 2014. 6 pp. + Appendices.

Kenney, D. 2016. An investigation of stream channel modifications at unauthorized suction dredging sites on the South Fork Clearwater River, October 7 and 8, 2015. Nez Perce-Clearwater National Forests. February 3, 2016. 5 pp. + Appendices.

Muck, J. 2010. Biological effects of sediment on bull trout and their habitat—Guidance for evaluating effects. U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, Lacey, WA.

NOAA Fisheries. 2006. Endangered Species Act Section 7 consultation biological opinion and Magnuson-Stevens Act essential fish habitat consultation for Lolo Creek suction dredging 2006 and 2007. Date issued: April 28, 2006. Snake River steelhead. Lolo Creek . 1706030616. NOAA Fisheries, Northwest Region, Seattle, Washington.

NOAA Fisheries. 2013. Endangered Species Act Section 7 consultation biological opinion and Magnuson-Stevens Act essential fish habitat consultation for the Lolo Creek suction dredging program, HUCs 1706030616 and 1706030618, Idaho County, Idaho, (One Project). Date issued: July 16, 2013. NOAA Fisheries, Northwest Region, Seattle, Washington.

NPT (Arnsberg, B.) 2015. Letter to providing Nez Perce Tribe fish data to William C. Schrader, Boise Office of the National Marine Fisheries Service. April 7, 2015. Orofino, ID. 2 pp.

Pauley, G.B., B.M. Bortz and M.F. Shepard. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest) steelhead trout. US Fish and Wildlife Service Biological Report 82(11.62). 24p. US Army Corps of Engineers, TR EL-81-4.

Reynolds, J. B.; Simmons, R. C.; Burkholder, A. R. 1989: Effects of placer mining discharge on health and food of Arctic grayling. Water resources bulletin 25: 625-635.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. Gen. Tech. Rep. INT-302. Ogden, UT: U.S. Dep. of Agriculture, Forest Service, Intermountain Research Station. 38 pp.

Rosgen, D. 1994. A classification of natural rivers. CATENA 22: 169-199.

Sigler, J.W., T.C. Bjornn, and F. H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. Transactions of the American Fisheries Society 113:142-150.

Somer, W.L. and T.J. Hassler. 1992. Effects of suction-dredge gold mining on benthic invertebrates in a northern California stream. North American Journal of Fisheries Management 12:244-252.

Stern, G.R. 1988. Effects of suction dredging mining on anadromous salmonid habitat in Canyon Creek, Trinity County, California. M.S. Thesis, Humboldt State University, Arcata, CA. 80 pp.

Stewart, D. and D. Sharp. 2003. A recreational suction dredge mining water quality study on South Fork Clearwater River, Idaho County, Idaho, Water quality summary report 34. Idaho Department of Environmental Quality, Lewiston Regional Office, October 2003. 14 pp + Appendix. (Also reference from Appendix A)

Thomas, V.G. 1985. Experimentally determined impacts of a small, suction gold dredge on a Montana stream. North American Journal of Fisheries Management 5:480-488.

Thurow, R. 1987. Evaluation of the South Fork Salmon River Steelhead Trout Fishery Restoration Program. Lower Snake River Fish and Wildlife Compensation Plan. Job Completion Report, Contract No 14-16-0001-86505. Idaho Department of Fish and Game.

USDA Forest Service. 2007. Northern Rockies Lynx Management Direction Record of Decision. National Forests in Montana, and parts of Idaho, Wyoming, and Utah. March 2007

U.S.D.A. Forest Service – Clearwater National Forest. 2008. Biological assessment: threatened, endangered and proposed species. Recreational suction dredging on USFS lands in the Lolo Creek drainage. Final version – February 21, 2008. Clearwater National Forest, Orofino, Idaho.

U.S.D.A. Forest Service - Clearwater National Forest. 2009. Small-scale suction dredging in Lolo Creek and Moose Creek. Clearwater and Idaho counties. Draft Supplemental Environmental Impact Statement (DEIS). December 2009. Clearwater National Forest, Orofino, Idaho.

U.S.D.A. Forest Service - Clearwater National Forest. 2010. Small-scale suction dredging in Lolo Creek and Moose Creek. Clearwater and Idaho counties. Final Supplemental Environmental Impact Statement (FSEIS) Chapter 7 and errata. March 2010. Clearwater National Forest, Orofino, Idaho.

U.S.D.A. Forest Service - Clearwater National Forest. 2010a. Small-scale suction dredging in Lolo Creek and Moose Creek. Clearwater and Idaho counties. Record of Decision (ROD). March 2010. Clearwater National Forest, Orofino, Idaho.

U.S.D.A. Forest Service – Nez Perce National Forest. 1998. South Fork Clearwater River Landscape Assessment. Volume 1. Narrative. Nez Perce National Forest, Idaho County, Idaho. (Also reference from Appendix D)

U.S.D.A. Forest Service – Nez Perce National Forest. 1999. South Fork Clearwater biological assessment Nez Perce National Forest, Grangeville, Idaho. (Also reference from Appendix D)

U.S.D.A Forest Service – Nez Perce National Forest. 2005. American and Crooked River project – final environmental impact statement. Nez Perce National Forest. Grangeville, ID. (Reference from Appendix D)

U.S.D.A. Forest Service – Nez Perce-Clearwater National Forests. 2013. Biological assessment for suction dredging on USFS-managed lands in the Lolo Creek drainage. Final version – April 9, 2013. Orofino, Idaho.

U.S.D.A. Forest Service and U.S.D.I. U.S.F.W.S. 2006. Canada lynx conservation agreement. October 2006.

U.S.D.I.-B.L.M. 2007. Final Environmental Impact Statement – Eastside township fuels and vegetation project, Volumes I and II. Coeur d'Alene District, Cottonwood Field Office, Cottonwood, ID. (Reference from Appendix D)

United States Fish and Wildlife Service (USFWS). 2002. Bull Trout (*Salvelinus confluentus*) Draft Recovery Plan. Portland, Oregon.

United States Fish and Wildlife Service (USFWS). 2015. Recovery Plan for the Coterminous United States Population of Bull Trout (*Salvelinus confluentus*), Mid-Columbia Recovery Unit Implementation Plan. September 2015. Portland, Oregon.

Van Nieuwenhuyse, E., and J.D. LaPerriere. 1986. Effects of placer gold mining on primary production in subarctic streams of Alaska. Wat. Res. Bull. 22(1):91-99.

Ward, D.L., B.J. Clemens, D. Clugston, A.D. Jackson, M.L. Moser, C. Peery, and D.P. Statler. 2012. Translocating adult Pacific lamprey within the Columbia River basin: state of the science. Fisheries 37(8): 351-361.

APPENDIX A

MAINSTEM SOUTH FORK CLEARWATER RIVER

SUCTION DREDGE MINING
MONITORING

SUMMARY OF RESULTS
1980--1998 (NPNF)
2001 (IDEQ)

Review of Suction Dredge Monitoring on the SFCR and Tributaries

In Forests files are three internal reports on suction dredge monitoring, with data from 1979-80 and 1993-7. In addition, the Idaho Department of Environmental Quality (IDEQ) published a report with data from 2001. The circumstances and conclusions of these reports are summarized below, and it should be noted that the effects observed or measured in these reports are not necessarily indicative of suction dredging under the conditions proposed in the current BA. The full texts of these reports are available upon request.

<u>Anonymous. 1980? Analysis of suction dredge mining on Forest stream habitats on the Nezperce National Forest. Report with handwritten notes, 17 pp.</u>

The NPNF sampled channel substrate (McNeil core sampler), bedload, and/or suspended sediment and measured stream discharge in conjunction with active suction dredging at sites on Crooked River, Newsome Creek, the SFCR, and Red River and at a site dredged in 1979, but not 1980 on Newsome Creek. At the five active dredging sites, samples were taken both above ("control") and below the dredging area. Of the four active sites at which channel substrate samples were collected, a statistically significant increase in fine sediment was observed at three sites, while a statistically insignificant decrease was observed at one site. At the Newsome Creek site dredged in 1979, but not in 1980, the control and "tailings" areas were not significantly different, but the "tailings" area had decreased from 33.7% in 1979 to 14.1% in 1980. Aside from the control sample, the bedload sampling of active dredging was conducted at sites 25, 50, 100, 200, 400, and 600 feet downstream from the dredge(s). At one of the four sites sampled for bedload, the background level (i.e., control) level of bedload was greater than that observed above the dredge, while the bedload increased above the background level at the other sites. At all four sites, no substrate larger than 9.6 mm was transported to the first (25-ft) transect, and at two of the sites, the upper size of transported substrate was 4.75 mm. Regarding suspended sediment, elevated levels were noted at the same transects at which bedload sampling occurred, and levels elevated over background were observed at nearly all transects, although it isn't obvious that the levels observed at all of the transects beyond 100 feet were visible plumes.

<u>Cannon, D. 1994. Dredge operations on Newsome Creek. January 19, 1994. Draft report attached to e-mail addressed to Nancy Rusho, with attached graphs, 11 pp.</u>

NPNF staff took cobble embeddedness (CE) and Wolman pebble count (WPC) data from 8 sites along 221 m of Newsome Creek, all downstream from a suction dredging operation which had ceased operation at some point that summer/fall prior to the October 6, 1993 sampling date. The 8 sites were apparently selected based on site characteristics (most in low-velocity areas) and so should not be considered an unbiased characterization of the full reach, nor were any "control" sites recorded. Percent weighted CE at the sites ranged from about 38 to about 87%, and average percent surface fines (from WPCs) at the sites ranged from about 18% to about 71%. The highest CE and percent surface fines values came from sites described as low-velocity. Attached to the text and tables describing the 1993 data collection on Newsome Creek are one graph each showing CE and percent surface fines data from Newsome Creek in both 1993 and 1994. The graphed values for 1993 appear to correspond to the data described above, and the 1994 data is apparently from 6 of the 1993 sites, along with two more, described as UC (upstream control?) and DC (downstream control?). Because there is no text associated with the 1994 portion of these graphs, no conclusions can be reached as to their implications, other than that sampling occurred.
The report does, however, mention in its text that sites on the SFCR (at RM 38.7) that same fall, and a graph apparently shows cobble embeddedness data at 4 sites on that stream, but no other information about SFCR suction dredging is provided, so the graph is not instructive.

<u>DeRito, J. 2000. Summary report of the suction dredge monitoring program 1995-1999, Nez Perce National Forest. 25 January 2000 draft report, 9 pp.</u>

The NPNF noted at least one suction dredging operation in the SFCR and 8 tributaries at least once in 1995-1998, for a total of at least 89 operations, and habitat sampling was performed at a few of these sites. The Forest sampled turbidity above and below active mining operations (sampling site locations/distances were not recorded) in 1995-1996 on the Red River on 1 date in 1995 and 2 dates in 1996, and in 1996 on the Crooked River and

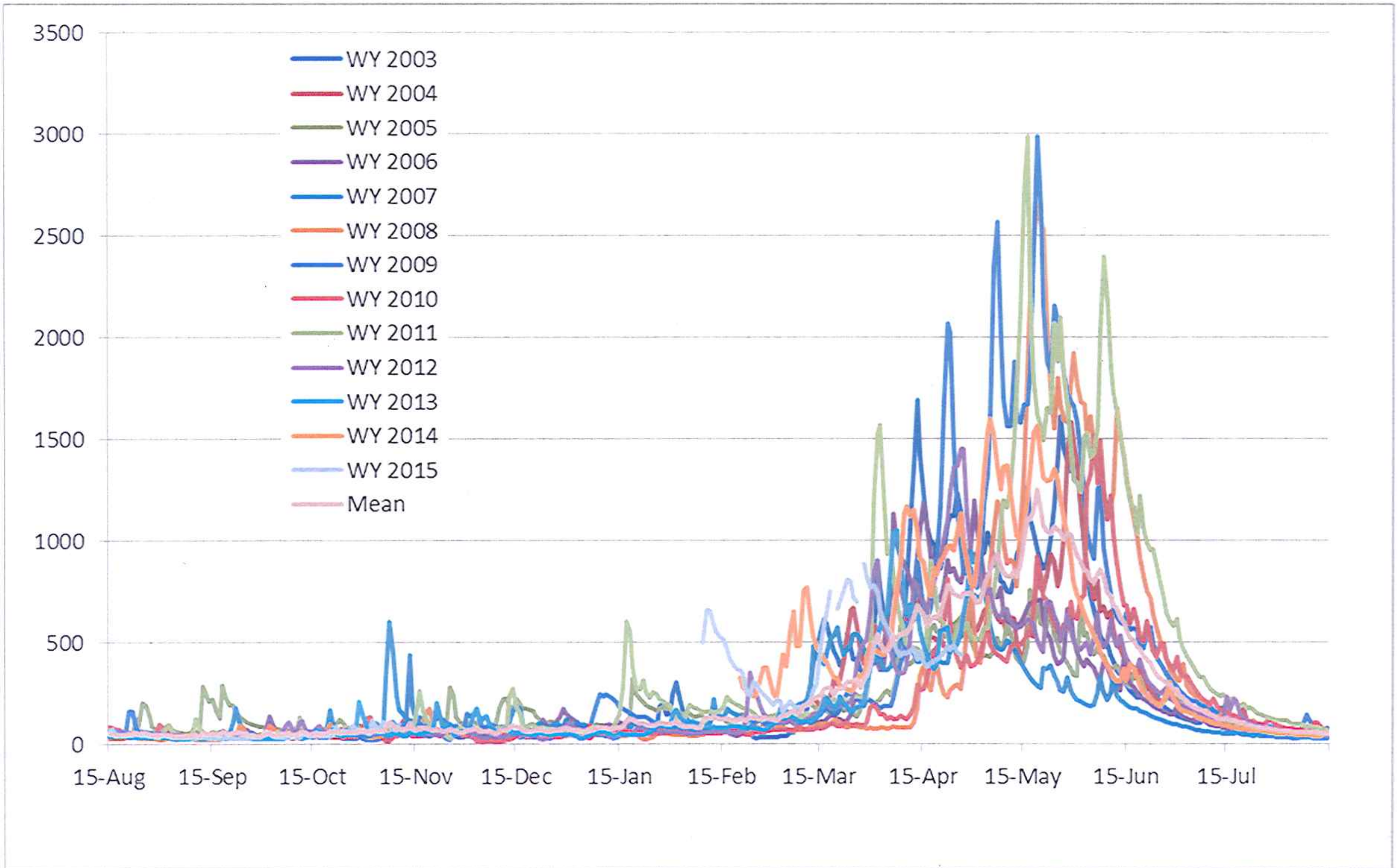
Relief Creek on one date each. Additional turbidity sampling was conducted in 1997-8, but the samples from the latter years had apparently not been processed by the date of the report. The 1995 data from the Red River did not come close to exceedance the Idaho instantaneous water quality standard of 50 NTUs, but the report stated that the operation sampled was not among those which caused substantial visible turbidity. Although elevated turbidity was noted below dredge operations at the 4 dates/sites in 1996, water quality standards were again reported as not exceeded. The Forest also reported sampling of surface fines below (using Wolman pebble counts) above and below active dredging operations in 1995 (4 sites), 1997 (2 sites), and 1998 (2 sites). Some sites saw an increase in surface fines and others a decrease, but the report stated that surface fines data were "difficult to interpret" because of sampling design flaws and paucity contextual information.

<u>Stewart, D. and D. Sharp. 2003. A recreational suction dredge mining water quality study on South Fork Clearwater River, Idaho County, Idaho, Water quality summary report 34. Idaho Department of Environmental Quality, Lewiston Regional Office, October 2003. 14 pp + Appendix.</u>

The IDEQ developed information and collected data at three sites on the mainstem SFCR in July and August, 2001. For the purpose of assessing compliance with the Idaho instantaneous and 10-day turbidity standards, the IDEQ developed "mixing zones" for each site and also took water samples above and below each dredge. While visually noticeable levels of turbidity were generated by suction dredging, these levels declined substantially within a few meters below each dredge. Neither instantaneous standards nor modelled 10-day standards were exceeded at any of the three sites. The IDEQ also sampled macroinvertebrates above and below the three operating dredges, and at the same site approximately 1 ½ months after the end of the dredging season. The IDEQ characterized the macroinvertebrate data as "inconclusive" because there did not seem to be any statistically significant differences between the sampling locations and dates. Finally, there were pebble count-based estimates of the proportions of fine sediment above and below two of the sites, with some samples also taken before and after dredging. Fine sediment was significantly less after dredging below the first site, while some elevation in fines was evident after and below the second site. The authors concluded that the 2001 monitored dredging activities "caused no measurable short term impairments in aquatic beneficial uses."

APPENDIX B

**RECENT
SFCR
HYDROGRAPHS**


3500
3000
2500
2000
1500
1000
500
0
15-Aug
15-Sep
15-Oct
15-Nov
15-Dec
15-Jan
15-Feb
15-Mar
15-Apr
15-May
15-Jun
15-Jul
WY 2003
WY 2004
WY 2005
WY 2006
WY 2007
WY 2008
WY 2009
WY 2010
WY 2011
WY 2012
WY 2013
WY 2014
WY 2015
Mean

APPENDIX C

IDWR LETTER PERMIT REQUIREMENTS AND INSTRUCTIONS RELEVANT TO PROPOSED ACTIVITIES

Definitions and Special Restrictions/Requirements

Stream Channel Alteration Any human-caused activity that alters, modifies, or changes the natural existing shape of the stream channel within or below the mean high water mark (MHWM) is considered an alteration and requires a stream channel alteration permit issued by IDWR. Mining or placer mining below the MHWM with non-powered equipment (see below) that exceeds minimum standards established by IDAPA 37.03.07 Rule 64 (see Attachment I) or with any mechanized mining equipment requires a stream channel alteration permit.

Mean High Water Mark (MHWM) A water level corresponding to the "natural or ordinary high water mark" as defined in Idaho Code § 58-104(9) and is the line which the water impresses on the soil by covering it for sufficient periods of time to deprive the soil of its terrestrial vegetation and destroy its value for commonly accepted agricultural purposes. (IDAPA 37.03.07.010.08)

Mechanized Mining Equipment Any equipment used to alter a stream channel that is operated by a motor, an engine, or anything other than human strength is considered mechanized mining equipment and requires a stream channel alteration permit (LETTER PERMIT). This includes powered sluice boxes, hydraulic concentrators (often referred to as a "high-banker"), suction dredges, or any other form of equipment used in mining to extract, collect, process, or concentrate earthen materials that uses other than human strength. Use of powered pumps that divert water from the stream or river to sluice boxes or high bankers operated below the MHWM is considered a mechanized mining operation and requires a LETTER PERMIT.

Non-Powered Mining Equipment Any equipment used to alter a stream channel that is operated by human strength is considered non-powered mining equipment. This includes non-powered sluices, pans, rockers, suction devices, and similar hand tools, etc., used to extract, collect, process, or concentrate stream bed materials that rely on human strength. When non-powered equipment is operated in a manner that exceeds the minimum standards for non-powered operations established by IDAPA 37.03.07 Rule 64 you must obtain a stream channel alteration permit (LETTER PERMIT on "open" streams; or Joint Application for Permits on all other streams).

IDWR Permit Requirement for Expedited LETTER PERMIT Idaho Code §42-3801 et seq., Alteration of Channels of Streams and the IDAPA 37.03.07 Rule 64, Suction Dredges and non-powered Sluice Equipment, govern recreational mining stream alterations. When stream alterations are done with processes commonly associated with recreational mining operations in areas and during timeframes indicated, the potential for negative impact is reduced and the expedited LETTER PERMIT may be used. These conditions include:

1. Permit holder will only work on a stream segment listed as open.
2. Permit holder will only work with equipment that complies with the following physical limits:
   a. Motor/engine rated at no greater than 15 HP; and
   b. Intake diameter no greater than five (5) inches
3. Permit holder has obtained permission from the land owner or land manager to access the property.
4. Permit holder has completed the application for an expedited LETTER PERMIT, including page 2 to locate their planned mining areas, including maps, if necessary.
5. Permit holder has provided a copy of these documents to IDWR and will maintain copies of these documents in their possession when conducting mining operations.
6. Permit holder has paid the appropriate fee and has evidence of payment with their LETTER PERMIT.

IDWR Permit Requirements for Joint Application for Permits to Alter a Stream Channel When the planned stream channel alteration will include the use of mechanized mining equipment that exceeds the physical limits described above for the expedited LETTER PERMIT or the use of any mechanized mining equipment on streams that are closed to recreational mining (not listed herein as open), the operator must submit a Joint Application for Permits and receive a stream channel alteration permit from IDWR prior to altering the steam channel. It is the applicant's responsibility to develop a project description, often referred to as a "plan of operation" that is acceptable to regulatory agencies that manage the lands and/or aquatic resources at the proposed project site. The Joint Application for Permits cannot be processed until the applicant has provided full and complete information on their planned operation. Providing results of your efforts to develop an acceptable "plan of operation" with your Joint Application for Permits may speed the processing of your stream channel alteration permit. The Joint Application for Permit may be obtained from the following web link:
http://www.nww.usace.army.mil/Portals/28/docs/regulatory/JtApplication/Jt.Application.pdf
http://www.nww.usace.army.mil/Portals/28/docs/regulatory/JtApplication/Instruction_Guide.pdf

Other Permit Requirements The individual miner is responsible for complying with all local, state, and federal permit requirements prior to operating mining equipment in the State of Idaho. **Miners need to contact EPA to obtain an NPDES permit** (see page 1 of these instructions for EPA contact information). A stream channel alteration permit does not serve in lieu of other permits that may be required by other state or federal government agencies; nor does it in any way constitute an exemption for other permit requirements except as specifically noted herein. The individual miner must also meet all requirements of the property owner or land manager. Please see Attachments D and E if you are mining on a navigable river.

Operation of any mining equipment on streambeds of navigable rivers must also comply with IDAPA 20.03.05., which can be found at the following link:
http://adminrules.idaho.gov/rules/current/20/0305.pdf

Operation above MHWM Any equipment set up and/or operated above MHWM is not covered by the stream channel alteration program and does not require a LETTER PERMIT. A permit is not required to remove and transport material from a stream channel to an upland location for processing as long as the removal of stream material is done by hand or human strength, and is within the limits for non-powered operations established by IDAPA 37.03.07 Rule 64. However, any withdrawal of water from a stream to operate your mining equipment located above the MHWM requires a valid temporary water right from IDWR (see Water Rights below).

Limitation of Mining Sites Only one (1) mining site per one hundred (100) linear feet of stream channel shall be worked at one (1) time. (IDAPA 37.03.07.064.07)

Operation near Stream Banks Operation of any mining equipment in a manner that results in the undercutting of a stream bank, the dislodging of stream bank vegetation, or that creates a condition whereby undercutting of stream bank will occur during high water is a violation of Idaho Code as well as a violation of your LETTER PERMIT requirements.

Operation near Boat Ramps Operation of any mining equipment is prohibited within 200 feet of any maintained boat ramp.
Operation near Stream Gaging Station Operation of any mining equipment is prohibited within 500 feet upstream or within 200 feet downstream of any stream gaging station.

Mining Claims The ownership of a mining claim does not exempt you from complying with stream channel alteration requirements. Idaho Code requires that you obtain a stream channel alteration permit prior to altering a stream channel even when that stream channel is within the limits of your mining claim.

Water Rights Under Idaho Code §42-201, diversion of water by pumping or other methods from a stream requires a water right from IDWR if the diverted water is used to operate mining equipment located above the MHWM. For information on obtaining a temporary water right to facilitate your mining operations contact the nearest IDWR office listed on the following page of these instructions.

Violations

All recreational mining activities conducted under a LETTER PERMIT must be in accordance with the Idaho Recreational Mining Program Instructions. Operators who conduct recreational mining activities in violation of Idaho Code §42-3809 are guilty of a misdemeanor and subject to revocation of their LETTER PERMIT and a fine of not less than one hundred fifty dollars ($150) nor more than five hundred dollars ($500); provided further, that each day such violation takes place shall constitute a separate offense punishable by a fine of not less than one hundred fifty dollars ($150) for each day until such activity is abated or voluntarily ceased.

ATTACHMENT A

EFFECTS OF RECREATIONAL SUCTION DREDGES ON FISH

Suction dredges and other recreational mining equipment, when improperly used, can cause severe damage to game fish populations. Trout and salmon spawn in gravel areas in Idaho streams. The eggs and alevins (newly hatched salmonid with yolk sac) remain in the gravel for several months before their yolk sac is absorbed and the alevins become free swimming fry. During the time that eggs and alevins are in the gravel, improperly operated suction dredges can reduce their survival in many ways.

The most obvious way that mining affects trout and salmon spawning is when the spawning gravels themselves are disturbed and the eggs and alevins are either crushed or exposed to predators. Another way that recreational mining may destroy fish eggs and alevins is by disturbing the fine sediments (e.g. sand and silt) in the stream, which is carried downstream and settles out in the spawning areas suffocating eggs and alevins.

To protect important spawning populations of salmon, steelhead and trout, streams are closed to recreational mining during the periods when fish are spawning and eggs or alevins are in the gravel. Because different species of fish spawn at different time, some streams have fish eggs or alevins in the gravel during every month of the year and are therefore closed year round to recreational mining activities.

The following three methods of operating recreational mining equipment constitute a violation that will damage fish populations and will result in the revocation of your stream channel alteration LETTER PERMIT and may result in penalties described within Idaho Code.

1. Do not operate in the gravel bar areas at the tail of pools. This is the area preferred by trout and salmon for spawning.

2. Do not operate in such a way that discharge of fine sediment from the mining equipment blankets gravel bars.

3. Do not change the stream channel in such a way that the current is directed into the bank causing erosion or destruction of the natural form of the channel.

The best areas for locating gold are located around boulders near the upstream end of pools where the current first starts to slow, in seams and pockets in exposed bedrock and around midstream boulders, or on the inside of a river bend at or near the head of a gravel bar where larger materials have accumulated. These are also areas where recreational mining has minimal effect on aquatic habitat.

ATTACHMENT B

RECOGNIZE AND AVOID SPAWNING AREAS

Trout construct spawning nests (redds) in clean gravel from ¼ - 1½ inches in diameter. The preferred site is a gravel bar at the tail or side of pools covered by 6 to 12 inches of smoothly flowing water. Redds may be recognized as round or oval depressions in the gravel which appear cleaner or brighter than the surrounding gravel.

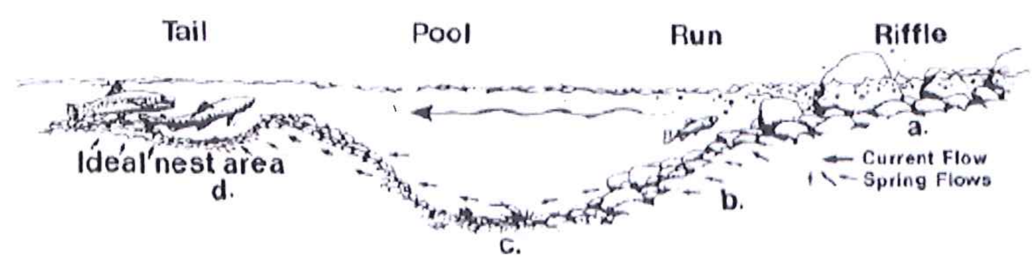
Salmon and Steelhead spawn in similar areas in gravel and cobblestones up to 3 - 4 inches in diameter.

Steelhead, Rainbow, and Cutthroat Trout can spawn from March through June, but primarily in the months of April and May, and their eggs and alevins remain in the gravel until mid-summer.

Spring and Summer Chinook Salmon typically spawn in August and September, Fall Chinook Salmon spawn in October and November. Their eggs and alevins remain in the gravel until the following spring.

Brook Trout, Brown Trout, Bull Trout, Kokanee, and Mountain Whitefish spawn from September into December and their eggs and alevins remain in the gravel during winter. Incubation of Bull Trout eggs also occur over a longer period than other species and their young have an extended period of residency in spawning gravels: 200 days as opposed to about 60 - 120 days for other trout.

Pacific Lamprey is an anadromous species present in the Snake River Drainage utilizing similar stream habitats to Chinook Salmon and Summer Steelhead. Lamprey adults migrate into the Columbia and Snake River basins from June through October, over winter, and spawn during April through July. Spawning substrates are fine to medium size gravels (0.25 to 1.0 inch diameter). Following a hatching period of 2 - 3 weeks, larvae (ammocoetes) rear in fine substrates where they remain for over 5 years until the transformation to adult is complete. Adults migrate to the ocean where they become parasitic.



The Natural Nest Areas that Most Spawning Salmonids (above): Use this drawing to recognize and avoid disturbing these type of areas.

2016 IDWR Recreational Mining Special Supplement South Fork Clearwater River

As of 2016, recreational mining on the South Fork Clearwater River (SFCR) requires completion of the *IDWR Recreational Mining Special Supplement, South Fork Clearwater River* (Special Supplement) application. The Special Supplement is an alternative recreational mining application that allows operators to apply for consideration to obtain a permit to operate a suction dredge on the SFCR.

In 2004, the Idaho Water Resource Board designated the SFCR as a State Recreational River, pursuant to Idaho Code §42-1734A. This designation limits and/or prohibits certain activities, including recreational dredge mining, in order to preserve water quality and/or wildlife habitat. The SFCR does not currently meet state water quality standards for sediment and is subject to a pollutant budget, known as a total maximum daily load (TMDL). To meet statutory requirements and state water quality standards for the SFCR, IDWR limits recreational dredge mining on the mainstem SFCR to 15 dredges from July 15 to August 15 each year. Additionally, the SFCR designation requires dredge sites to be inspected by IDWR with a fisheries biologist.

The first 15 applicants to fulfill all of the following IDWR requirements will be authorized to operate recreational mining equipment in the SFCR (in areas designated as OPEN in the 2016 IDWR Recreational Mining Program Instructions):

- submit a *complete* Special Supplement, SFCR application (below), including all required information, signatures, diagrams, fees and maps (incomplete applications may be delayed or not processed);
- meet with IDWR, during or after initial site visit with fisheries biologist (Special Condition #3), to inspect the proposed dredge site(s); and
- receive written approval and a SFCR suction dredge ID card as determined by IDWR.

Permittees failing to adhere to the requirements as outlined in the Special Supplement, including Special Conditions (below), may incur legal consequences, such as a misdemeanor charge and/or fines, as outlined in Idaho Code §42-3809 and §42-1701B.

The US Environmental Protection Agency (EPA) requires an NPDES general permit for small scale suction dredging in Idaho. Anyone operating a small suction dredge on *any* stream or river in Idaho should **contact the EPA to obtain an NPDES general permit.**

EPA Idaho Operations Office
950 W Bannock, Suite 900
Boise, ID 83702
208-378-5746

Additional information regarding NPDES permitting may be obtained via the EPA's Idaho website: http://yosemite.epa.gov/r10/water.nsf/npdes+permits/idsuction-gp.

The US Forest Service (USFS) or Bureau of Land Management (BLM) requires operators to submit a Plan of Operations in accordance with the draft *Decision Notice and Finding of No Significant Impact for Small-Scale Suction Dredging in Orogrande and French Creeks and South Fork Clearwater River.*

Nez Perce-Clearwater National Forest
104 Airport Road
Grangeville, ID 83530
208-983-1950

BLM Cottonwood Field Office
1 Butte Drive
Cottonwood, ID 83522
208-962-3245

APPENDIX D

SFCR WATERSHED
HISTORICAL AND RECENT INFORMATION

The following summary is primarily taken from the Idaho Department of Environmental Quality and U.S. EPA's South Fork Clearwater River Subbasin Assessment and Total Daily Maximum Load document from October of 2003. The IDEQ/EPA document in turn attribute the majority of background text and statistics from the South Fork Clearwater River Biological Assessment (USFS 1999), and the South Fork Clearwater River Landscape Assessment (USFS 1998). As a result, some of the data is dated. The IDEQ/EPA document also includes several appendices which provide in-depth information on Fisheries Resources (App. D), Stream and River Temperature Data (App. J) and Stream Habitat Data (App. K).

Overview: The SFCR Subbasin is located in north-central Idaho and encompasses an area of approximately 1,175 square miles (751,776) acres in size; BLM lands within the subbasin total 2% (15,203 acres) and Forest Service lands total 68% (approximately 515,000 acres). The subbasin extends from the headwaters above Elk City (elevation 6,382 feet) to the confluence with the Middle Fork of the Clearwater River at Kooskia, Idaho (elevation 1,280 feet). American River and Red River flow together at river mile 62.5 to form the SFCR. The SFCR flows into the Clearwater River at river mile 74.4. The lower 12.8 miles of the SFCR main stem flow through the Nez Perce Tribal Reservation.

Hydrography and Hydrology: The SFCR flow regime reflects the annual precipitation and temperature patterns. Precipitation in the subbasin ranges from 25 inches at the lower elevations to over 50 inches at the higher elevations. Ten percent of the annual precipitation in Kooskia falls as snow,whereas 40% of the precipitation in Elk City is snow. Annual runoff from the SFCR Subbasin averages about 12 inches, as measured by the U.S. Geological Survey (USGS) stream gage at Stites. Mean annual streamflow at Stites, the lower end of the subbasin, is 1,060 cubic feet per second (cfs). Streamflows are highest in May with an average of 3,370 cfs. Flows are lowest in September with an average of 258 cfs.

The SFCR typically experiences annual flood peaks during late April, early May, or early June. An average spring runoff peak at Stites is about 5,000 to 7,000 cfs. The largest flood of record was on June 8, 1964, with an estimated peak of 17,500 cfs. Floods occasionally result from snowmelt or rain-on-snow between November and March. An analysis of peak flow records at Stites shows that 15% of flood peaks occurred during this period. Only 5% of flood peaks occurred during these months upstream near the forest boundary as shown by historic gaging station records. Further upstream, near Elk City, only 3% of flood peaks occurred during these months. These differences show the transition of climatic conditions from the lower to upper parts of the subbasin, as well as the relative dominance of peak flows during spring runoff.

The major tributaries in the upper reaches of the SFCR watershed (i.e., American River, Red River, Crooked River, and Newsome Creek) have a runoff regime very similar to the main stem. They drain large areas of rolling upland terrain and typically do not have a flashy response to floods due to elevation, climate, relatively deep soils, forest vegetation, and moderate topography.

The runoff regimes of tributaries between Newsome Creek and the NPCNF boundary in the lower part of the subbasin are relatively complex, and depend on size, elevation, and landform. For example, Johns Creek and Tenmile Creek drain high elevation terrain in their headwaters and mid- to low-elevation breaklands in their lower reaches. Due to the high elevation headwaters, peak flows often occur several weeks later in the spring than the upper subbasin streams. Medium size, mid-elevation tributaries, including Silver Creek, Mill Creek, Twentymile Creek, and Meadow Creek have a similar runoff regime to the major upper basin streams described above. The smaller tributaries in this reach of the South Fork Canyon often originate on low elevation breaklands that are subject to winter rain-on-snow events or spring and summer thunderstorms. These events can produce localized floods and debris torrents. Butcher Creek, Threemile Creek, and Cottonwood Creek drain the Camas Prairie and have a significantly different runoff regime. They often have their annual peak flows in the midwinter, associated with rain-on-snow or rapid snowmelt events. Spring rains can also produce peak flows in these streams. These streams experience low flows earlier in the season than upstream tributaries.

SFCR Mainstem Fisheries and Fish Habitat: Fish found in the SFCR include: ESA-listed steelhead trout, bull trout, and fall Chinook salmon. BLM and Forest Service sensitive fish species include: spring/summer Chinook salmon, Pacific lamprey, rainbow/redband trout, and westslope cutthroat trout. Other native fish known to occur in the SFCR include: mountain whitefish, northern pikeminnow, chiselmouth, bridgelip sucker, sculpin, redside shiner, speckled dace, and longnose dace. Non-native species occurring in the SFCR include: brook trout, Yellowstone cutthroat trout, black bullhead, and smallmouth bass.

The primary limiting factors for fish production include high summer water temperatures, sediment, and poor instream cover conditions (USDA-FS 1999a). The SFCR is considered water quality limited (303(d) listed) from its headwaters at the confluence of Red River and American River to the mouth at Kooskia. The current estimated annual sediment yield over base delivered to the main stem SFCR at the NPCNF boundary is approximately 5.6% (USDA-FS, 2005a) and the estimated annual sediment yield over base delivered to the SFCR at the mouth of Crooked River is estimated to be 16 percent (USDI-BLM 2007). The SFCR has elevated summer water temperatures, which are often over 20°C during the summer and exceed 25°C in lower reaches of the river. Refer to Appendix B, which depicts flow regimes for the SFCR.

Historic mining has affected portions of the main stem and some tributaries, primarily in upper river areas. As of the mid-1990's, timber harvest has occurred on 19,545 acres (22% of the area) with about 3,300 acres in the RHCA. The majority of timber harvests occurred between 1960 and 1990, mainly as clearcuts, and the pace of harvest on Federal lands has slackened since then. There are approximately 487 miles of existing roads, with about 160 miles located in the RHCA. Many roads, including the highway along the river, encroach on stream/riparian processes. About one third of the area is considered to have a low level of human development. Management activity has also affected the sediment regime, although the precise effects on the main stem are unknown.

The main stem SFCR begins at the confluence of the American River and the Red River. From this point to about Tenmile Creek, the river is relatively low-gradient (C channel) riffle/pool habitat dominated by gravel and cobble substrate. The channel has been altered by dredge mining and the placement of State Highway 14. From Tenmile Creek to Mill Creek, the river becomes steeper and more confined with the substrate dominated by boulders and cobbles. The channel type is typically Rosgen A, B, or G. This is a high-energy reach through which the sediment is readily transported. From Mill Creek to just above Threemile Creek, the river alternates between relatively flat, unconfined reaches and steep, narrow, confined reaches. The Rosgen channel type varies widely (A, B, C, or G). From Butcher Creek to its confluence with the Clearwater River at Kooskia, the SFCR is a relatively flat, unconfined, C channel, dominated by riffle/pool habitat with gravel and cobble substrate. This lowest reach of the river has been partially confined by dikes in the vicinity of Stites and Kooskia.

The lower reaches of the SFCR have been affected to various degrees by aggradation, channelization, diking, riparian vegetation removal, and encroachment by roads and buildings. Aggradation of the river is associated with bedload from upstream sources, most noticeably from the major Camas Prairie tributaries (Butcher Creek, Threemile Creek, and Cottonwood Creek), and localized bank erosion. In the unconfined reaches of the South Fork, this has resulted in a wider, shallower channel with fewer large pools. Fish habitat has been affected by less cover, fewer deep holding areas, elevated sediment yields, and warmer summer water temperatures. These conditions have resulted in reduced connectivity and rearing capability.

The face drainages currently are rated low condition for road density and streamside road density. There are an average of 3.51 miles of roads per square mile of watershed, and an average streamside road density of 4.36 miles per square mile. Landslide prone road density is considered moderate at 1.1 miles per square mile throughout the face drainages. Potential changes in peak/base flow and water yield rate as low condition. The average ECA for the face drainages (9.6%) suggests that there should not be significant effects on peak/base flow related to fires or logging. However the moderately high ECA values in some watersheds (15-30%) and extremely high ECA values in Nelson Creek (48.2%) and Earthquake Creek (36.1%) may be causing localized impacts in individual watersheds and on the main stem SFCR (USFS 1999).

Sediment yield from the face drainages and SFCR main stem was estimated at 9% over base in the late 1990s, rating as moderate condition. Stream bank stability of the main stem is rated high condition due to armoring along Highway 14. The opposite bank is primarily composed of bedrock and large boulders. Suspended sediment levels are fairly low, rating high condition for habitat. Mainstem suspended sediment averages exceeded 25 milligrams per liter (mg/L) for 8 days and 80 mg/L for one day during years 1988-1992 (USFS 1999). Cobble embeddedness (40%) is rated low condition for the upper SFCR. Percent surface fines were 12% in the upper SFCR and were rated moderate condition. Percent fines by depth for spawning gravels are rated poor condition for the upper SFCR and 40% were less than 6.3 mm (USFS 1999).

Temperature is rated low condition for bull trout and steelhead spawning, rearing, and migration. The highest mean weekly temperature was 26.6 °C (80.0 °F) at the Mount Idaho bridge, and temperatures exceeded 15.5 °C (59.9 °F) during the steelhead spawning interval (USFS 1999).

Generally temperatures in the SFCR mainstem exceed native fish preference during portions of the year and temperatures increase after the river leaves the NPCNF. Several factors contribute to this temperature increase including stream aspect (north-south), elevation, warmer ambient air temperature, and a high width-to-depth ratio. Data collected in the SFCR between 1991 and 1993 by the NPCNF, BLM, and USGS (USFS 1999) show temperatures exceeding levels conducive to chinook, steelhead/rainbow, cutthroat, and bull trout optimal growth, migration, and survival (Table 5).

Table 5. SF CWR temperatures, 1991-1993 (USFS 1999).

Site	Year	Days >20 °C (68 °F)	Maximum Temperature
Mt. Idaho	1991	44 (24 consecutive days)	24.1 °C (75.4 °F)
Mt. Idaho	1992	14 (9 consecutive days)	22.3 °C (72.1 °F)
Stites	1992	34	27.1 °C (80.8 °F)
Mt. Idaho	1993	0	19.0 °C (66.2 °F)
Stites	1993	32	22.6 °C (72.7 °F)

Data collected by the BLM just upstream of the Crooked River Bridge (approximately 27 miles upstream from the Mt. Idaho Bridge) suggest that the temperatures recorded at the Mt. Idaho site are indicative of those found throughout the upper SFCR basin (USFS 1999). Summer maximum water temperatures in the upper reaches of the main stem are probably significantly elevated above natural, since the river there is primarily composed of inflows from impacted tributaries such as the American River, Red River, Newsome Creek, and Crooked River.

Riparian vegetation has been severely reduced for the entire length of the main stem by State Highway 14. Invasions of knapweed have occurred along both banks. Herbicides are routinely applied by the Idaho Transportation Department (ITD). Floodplain connectivity is rated low condition. The location of the highway has led to a reduction in riparian and wetland areas and a significant change in riparian vegetation/succession.

History and Economics: The SFCR was once a major producer of steelhead and spring chinook salmon. The mainstem and almost all tributaries with adequate access and discharge supported spawning and rearing for steelhead. Cutthroat and bull trout populations are also believed to have thrived throughout the subbasin. The lower SFCR may have supported runs of coho and fall Chinook salmon. The productivity of the subbasin is believed to have been historically higher as a function of nutrient supplementation from the Pacific Ocean when large numbers of anadromous salmonids provided nutrients both in the form of thousands of decaying carcasses from returning adults and the millions of eggs laid annually. In addition, the rearing juveniles provided a large prey base for resident salmonids.

The decline of the fishery and habitat in the SFCR Subbasin probably began in 1861 when gold was discovered in the basin. Early mining, along with the associated grazing and timber harvest, is likely to have created only localized degradation. The decline accelerated in 1900 when large-scale hydraulic and dredge mining began. Road construction, primarily to access mining claims, also increased. A lull in large-scale mining occurred between about 1910 and 1930. In 1930, large-scale mining projects resumed and continued through the late 1950s. Newsome Creek, American River, Red River, and Crooked River were among the most heavily impacted. Between 40 and 50 miles of prime spawning and rearing habitatwere drastically altered and heavily degraded by dredge mining, and large amounts of sediment were released into the tributaries and the SFCR main stem.

As hydraulic and dredge mining activity declined, commercial timber harvest and road construction activity increased, most dramatically during the 1960s. This increase created another large, sustained peak in sediment levels. Harvest units typically did not have riparian buffers, and roads were poorly constructed. Streams were frequently straightened to accommodate roads, and the reconstruction of the South Fork Highway (Highway 14) resulted in constriction, steepening of the channel, and direct sediment delivery. Grazing probably peaked in the 1920s and currently occurs at a lower level. Grazing impacts have been most severe in some of the important anadromous spawning and rearing areas in the Red River, American River, and Meadow Creek. Grazing has also impacted a number of smaller tributaries and has had severe impacts in many of the lower mainstem tributaries as well.

In 1911, a dam was constructed on the lower SFCR main stem below the NPNF boundary near Harpster, near river mile 22 (upstream from the mouth), to provide power to the city of Grangeville. A fish ladder was installed in 1935 and remained until 1949, when it was destroyed by high water. Thus, the dam was a complete barrier to fish migration, and anadromous salmonids (chinook, coho, steelhead) and Pacific lamprey were excluded from the upper watershed from 1911 to 1935, and from 1949 until 1963, when the dam was removed. A second dam was constructed on the Clearwater River main stem near Lewiston in 1927 and was removed in 1974. This dam's fish ladder was remodeled around 1939 because the original ladder functioned poorly. Even though run sizes were sharply reduced, some passage of anadromous fish is believed to have occurred during 1927-1939. Two potential fish barriers on the SFCR include the Kooskia Flower Mill Dam and the Dewey Mine Dam. Fish passage conditions from these dams are not fully known, but they don't appear to have been complete migration barriers. These two dams no longer exist. Construction of downstream dams on the main stem of the Snake and Columbia Rivers has also contributed to the decline of anadromous fisheries in the SFCR Subbasin.

The exclusion of anadromous salmonids from the upper watershed caused a major decrease in the availability of forage fish for cutthroat and bull trout. This decrease coupled with habitat degradation is believed to have caused sharp reductions in cutthroat and bull trout populations beginning in the 1930s. Increased fishing pressure following completion of a road adjacent to the SFCR in 1932 may have also contributed to the decline

Anadromous salmonids returned to the upper SFCR watershed through a combination of natural straying and reintroduction efforts after the Harpster dam was removed. However, by this time, prime spawning and rearing areas were heavily degraded. Populations of anadromous and resident fish have not recovered, and current population levels represent only a small percentage of their original levels. Even in the current degraded condition, under-utilized spawning and rearing habitat is available in the watershed. Thus the potential remains for the SFCR to play a significant role in the recovery of anadromous salmonids if escapement at downstream dams can be improved.

Mining: The first major gold discovery in the subbasin was in June 1861, near Elk City. A placer mining boom followed, concentrated in the upper part of the basin. Hydraulic mining began in the mid-1860s resulting in thousands of cubic yards of sediment being washed into stream channels and rivers. The first dredge operated in the Elk City area in 1891. In 1902, the first ore processing mill, the "American Eagle," was built and full scale lode mining began. In upland areas, lode mines averaged a few acres in size and most work was completed with hand tools, which limited watershed impacts. However, the mills were located near streams for water and power supply, and it is likely that cyanide and mercury contaminated tailings were discharged into them.

The 1930s depression era brought a revival of placer mining and some lode mining. Most of the heavy dredging occurred in the tributaries (Newsome Creek, American River, Red River, and Crooked River), and in the upper section of the SFCR main stem extending from the mouth of Newsome Creek to the upper reaches. Most of these impacts occurred in the lower gradient sections, which provide the richest spawning and rearing habitat. Hydraulic mining of hillsides also revived in the 1930s. Large amounts of sediment caused changes in stream morphology as the volume was too great to be washed downstream. The pits left by hydraulic mining, called "glory holes" continue to be a focus of current restoration efforts. Their large, unvegetated, unstable banks are constantly eroding and contributing sediment to the system.

By 1960, more than 24 million cubic yards of material had been dredged in the subbasin, affecting approximately 30 miles of stream. Recent mining activity consists mostly of small scale suction dredging, placer and lode operations, and aggregate sources (rock pits). Approximately 70 aggregate sources have been developed in the subbasin over the years. Most are bank excavations above an entry road, and others utilize existing dredge tailings. The USFS mining regulations have led to a reduction in mining impacts since 1974. One provision in these regulations requires that the operator furnish a bond to ensure that reclamation occurs. Environmental laws passed in the 1970s and 1980s have also reduced mining impacts.

Literature Cited

IDEQ and EPA (Idaho Department of Environmental Quality and U.S. EPA). 2003. South Fork Clearwater River subbasin assessment and total maximum daily loads. October 2003. Lewiston and Boise, ID. 303 pp + Appendices.

USDA-FS. 1998. South Fork Clearwater River Landscape Assessment. Volume 1. Narrative. Nez Perce National Forest, Idaho County, Idaho.

USDA-FS. 1999. South Fork Clearwater biological assessment. Nez Perce National Forest, Grangeville, Idaho.

USDA-FS. 2005. American and Crooked River project – final environmental impact statement. U.S. Dept. of Agriculture, Forest Service, Red River Ranger District, Nez Perce National Forest. Grangeville, ID.

USDI-BLM. 2007. Final Environmental Impact Statement – Eastside township fuels and vegetation project, Volumes I and II. Coeur d'Alene District, Cottonwood Field Office, Cottonwood, ID.

APPENDIX E

ENVIRONMENTAL BASELINE INFORMATION
PROJECT EFFECTS ANALYSIS
SUCTION DREDGE MINING CLAIMS
South Fork Clearwater River Mainstem

Stream: Mainstem South Fork Clearwater River
Drainage: Several Subwatersheds
Watershed: Several Watersheds
Subbasin: South Fork Clearwater River

Project or Actions	Suction Dredging – USFS and BLM-managed Lands
Watershed Road Density	
Streamside Road Density	
Landslide Prone Road Density	
Disturbance History	
Riparian Vegetation Condition	
Peak/Base Flow	
Water Yield (ECA)	
Sediment Yield	
Width/Depth Ratio	
Stream Bank Stability	
Floodplain Connectivity	
Temperature - Spawning	
Temperature -Rearing and Migration	
Turbidity or Suspended Sediment	-4
Chemical Contaminants - Nutrients	-2
Physical Barriers - Adults	-1
Physical Barriers - Juvenile	-1
Cobble Embeddedness	-2
% Fines (Surface or by Depth)	-2
Large Woody Debris	-1
Pool Frequency	
Pool Quality	-2
Off-Channel Habitat	
Habitat Refugia	
Harassment	-4 (SH)
Redd Disturbance	
Juvenile Harvest	-4 (SH)

SH=Steelhead Trout
Blank boxes indicate no effect on the indicator by the action

Probability of Effect					
Potential Level of Effect	**None**	**Very Low**	**Low**	**Moderate**	**High**
None	0	0	0	0	0
Very Low	0	1	1	1	1
Low	0	1	1	2	2
Moderate	0	2	3	3	4
High	0	3	4	4	4

DOCUMENTATION OF ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION(S) ON RELEVANT INDICATORS

WATERSHED NAME: South Fork Clearwater River SUBBASIN NAME: South Fork Clearwater River
ACTION(S): Suction Dredging Plans of Operation
SPECIES/LIFE STAGE: Steelhead Trout, Bull Trout, Spring/Summer and Fall Chinook Salmon, Coho Salmon

PATHWAYS	ENVIRONMENTAL BASELINE 1/			EFFECTS OF THE ACTION		
Indicators	High	Moderate	Low	Restore 2/	Maintain 3/	Degrade 4/
WATERSHED CONDITIONS						
1. Watershed Road Density			X		X	
2. Streamside Road Density			X		X	
3. Landslideprone Road Dens.		X			X	
4. Riparian Vegetation Cond.		X			X	
5. Peak/Base Flow			X		X	
6. Water Yield (ECA)			X		X	
7. Sediment Yield		X			X	
CHANNEL COND.&DYNAMICS						
1. Width/Depth Ratio		X			X	
2. Streambank Stability	X				X	
3. Floodplain Connectivity			X		X	
WATER QUALITY						
1. Temp.-Spawn.			X		X	
2. Temp.-Rear/Migration			X		X	X ST
3. Suspended Sediment			X		X	
4. Chem. Contam./Nutrients		X			X	
HABITAT ACCESS						
1. Physical Barriers - Adult	X S.Fk. CW		X (Tribs.)		X	
2. Physical Barriers -- Juvenile	X S.Fk. CW		X (Tribs.)		X	

1/ Indicators of high, moderate, or low habitat condition. Refer to specific subbasin/watershed BAs for river and stream environmental baseline information.
2/ For the purposes of this checklist, "restore" means to change the function of an indicator for the better, or that the rate of restoration rate is increased.
3/ For the purposed of this checklist, "maintain" means that the function of an indicator will not be degraded and that the natural rate of restoration for this indicator will not be retarded.
4/ For the purposed of this checklist, "degrade" means to change the function of an indicator for the worse, or that the natural rate of restoration for this indicator is retarded. In some cases, a "not properly functioning" indicator may be further worsened, and this should be noted.

CONTINUED: DOCUMENTATION OF ENVIRONMENTAL BASELINE AND EFFECTS OF ACTION(S) ON RELEVANT INDICATORS

WATERSHED NAME: South Fork Clearwater River SUBBASIN NAME: South Fork Clearwater River
ACTION(S): Suction Dredging Plans of Operation
SPECIES/LIFE STAGE: Steelhead Trout, Bull Trout, Spring/Summer and Fall Chinook Salmon, Coho Salmon

PATHWAYS	ENVIRONMENTAL BASELINE 1/			EFFECTS OF THE ACTION		
Indicators	High	Moderate	Low	Restore 2/	Maintain 3/	Degrade 4/
HABITAT ELEMENTS 1. Cobble Embeddedness		X 30% (00)				X (SH)
2. Percent Surface Fines	X 5% (00)					X (SH)
3. Percent Fines By Depth			X 40% (00)			X (SH)
4. Large Woody Debris			X		X	
5. Pool Frequency			X		X	
6. Pool Quality			X			X (SH)
7. Off-Channel Habitat			X		X	
8. Habitat Refugia		X			X	
TAKE 1. Harassment		X				X – (SH) ST
2. Redd Disturbance	X				X	
3. Juvenile/Adult Harvest			X		X	X (SH)
BULL TROUT SUBPOP. CHAR. AND HABITAT INTEGRATION 1. Subpopulation Size			X		X	
2. Growth and Survival			X		X	
3. Life History Diversity, Isolation			X		X	
4. Persist. & Genetic Integrity			X		X	
5. Integr. of Species & Habitat Condition			X			X (SH) – ST

1/ SH=Steelhead trout; BT=Bull trout
ST=Short Term; LT=Long Term

Appendix F. Project Checklists

PRE-Project Checklist
SFCR Small-Scale Placer Mining

Complete checklist prior to implementation and submit to NMFS and FWS at Level 1 meetings. Use one checklist/per mining operation site.

Provide the following attachments: draft Plan of Operation information, details of known ESA-listed species presence/absence, map/satellite photos and coordinates, any ground photos of mining site, and documentation if any are not applicable.

Plan of Operation Name	
Bankfull width, dominant substrate, and channel gradient of proposed mining site	
Proposed length of mining site	
Anticipated dates and frequency of mining	
Anticipated adverse effects to listed species (Y/N)	
If 'Yes,' provide brief explanation:	
Project Review Team members	**Additional Team members, if necessary**
Fisheries Biologist:	
Wildlife Biologist:	
Hydrologist:	
Minerals:	

USFWS/NMFS Tracking #s: ____________________

POST-Project Checklist

Complete draft checklist by November 30 of each dredging year and submit to NMFS and FWS at Level 1 Meeting. Use one checklist/mining operation. Provide the following attachments: pre- and post-operation photos and applicable reports; pre-project checklist.

Project Name	
Dates of inter- and post-project inspection/monitoring	
Was mining operation fully compliant with operational and reporting requirements?	
If 'No,' provide appropriate explanation	
Mining start and end dates, total hours	
Stream channel length, area, and volume disturbed	
Number, species, and life stage of ESA-listed fish *observed*	

USFWS/NMFS Tracking # ____________________

APPENDIX G

2013 and 2014

SFCR WATER TEMPERATURE DATA
DURING DREDGING SEASON

DOBOS (2015)

South Fork Clearwater River Mainstem Sites above tributaries--Daily Maximum Temps during SD Season

Date	Crooked River	Newsome Creek	Tenmile Creek	Silver Creek	Johns Creek	Bully Creek	Idaho Grade	Harpster Grade	Full SD Reach Mean	Full SD Reach MWMT
7/9/2013	23.292	23.388	22.429	19.758	20.537	20.996	21.473	22.717	21.8	n/a
7/10/2013	23.292	23.677	22.333	20.138	20.901	21.378	21.664	23.004	22.0	n/a
7/11/2013	21.282	20.805	20.805	19.187	19.992	20.138	20.805	21.951	20.6	n/a
7/12/2013	20.615	20.138	19.567	17.855	18.719	20.043	20.234	21.76	19.9	n/a
7/13/2013	21.187	21.569	20.329	17.57	18.447	19.092	19.377	20.996	19.8	n/a
7/14/2013	21.951	22.142	20.996	18.521	19.356	19.758	19.853	21.282	20.5	n/a
7/15/2013	22.908	22.908	21.855	19.092	19.901	20.615	20.71	22.142	21.3	20.8
7/16/2013	22.333	21.951	21.187	19.187	19.992	20.519	20.71	29.652	21.9	20.9
7/17/2013	24.255	24.062	23.004	20.996	21.720	22.333	22.046	23.388	22.7	21.0
7/18/2013	24.351	24.351	23.196	20.615	21.356	22.717	22.621	24.255	22.9	21.3
7/19/2013	24.158	24.062	23.004	20.138	20.901	22.333	22.238	24.255	22.6	21.7
7/20/2013	23.966	23.869	22.812	19.948	20.719	22.333	22.142	24.255	22.5	22.1
7/21/2013	23.773	23.677	22.621	19.853	20.628	22.142	21.855	24.158	22.3	22.3
7/22/2013	23.388	23.292	22.333	19.662	20.446	22.046	21.76	24.062	22.1	22.5
7/23/2013	23.966	23.773	22.812	19.758	20.537	22.238	21.76	24.351	22.4	22.5
7/24/2013	24.351	24.062	22.908	19.853	20.628	22.525	21.951	24.448	22.6	22.5
7/25/2013	24.158	24.255	23.1	19.377	20.173	22.812	22.333	24.835	22.6	22.5
7/26/2013	23.292	22.621	21.951	18.996	19.809	22.142	21.664	24.255	21.8	22.3
7/27/2013	23.677	23.388	22.429	18.521	19.356	22.333	21.855	24.448	22.0	22.3
7/28/2013	22.812	22.525	21.569	18.045	18.901	21.473	21.091	23.484	21.2	22.1
7/29/2013	21.76	21.664	20.805	17.475	18.356	20.805	20.424	22.621	20.5	21.9
7/30/2013	22.046	21.664	20.996	17.379	18.265	20.805	20.71	23.196	20.6	21.6
7/31/2013	20.805	21.091	20.138	17.284	18.174	20.138	20.234	22.333	20.0	21.3
8/1/2013	18.806	19.187	19.092	17.094	17.992	19.092	19.853	21.091	19.0	20.8
8/2/2013	16.999	18.045	17.665	16.618	17.538	17.76	18.331	19.187	17.8	20.2
8/3/2013	19.472	20.043	20.424	18.045	18.901	19.662	19.282	20.996	19.6	19.8
8/4/2013	21.473	21.569	20.805	18.236	19.083	20.901	20.424	22.621	20.6	19.7
8/5/2013	21.473	21.855	20.996	18.14	18.992	20.901	20.424	22.812	20.7	19.8
8/6/2013	22.333	22.238	21.473	18.045	18.901	21.951	21.282	23.677	21.2	19.9
8/7/2013	22.238	22.142	21.282	17.855	18.719	21.76	21.282	23.773	21.1	20.0
8/8/2013	21.951	21.855	21.378	17.475	18.356	21.187	20.996	23.484	20.8	20.3
8/9/2013	20.901	21.187	20.805	18.045	18.901	20.996	21.187	22.525	20.6	20.7
8/10/2013	21.569	21.664	21.091	18.521	19.356	20.71	20.71	22.908	20.8	20.8
8/11/2013	19.567	19.758	19.472	18.426	19.265	19.853	20.043	21.569	19.7	20.7
8/12/2013	20.805	19.948	19.567	18.711	19.537	20.71	20.615	22.812	20.3	20.7
8/13/2013	21.187	21.855	21.664	19.567	20.355	21.378	21.378	23.773	21.4	20.7
8/14/2013	21.951	21.951	21.473	19.377	20.173	21.473	21.378	23.677	21.4	20.7
8/15/2013	22.525	22.429	21.951	19.187	21.855	21.76	21.664	24.158	21.9	20.9
SD Season	**22.2**	**22.2**	**21.4**	**18.7**	**19.6**	**21.3**	**21.1**	**23.4**	**21.2**	**21.2**

South Fork Clearwater River Mainstem Sites above tributaries--Daily Maximum Temps during SD Season

Date	Crooked River	Newsome Creek	Tenmile Creek	Silver Creek	Johns Creek	Bully Creek	Idaho Grade	Harpster Grade	Full SD Reach Mean	Full SD Reach MWMT
7/9/2014	20.805	20.805	20.519	18.806	19.187	18.045	18.996	20.234	19.7	n/a
7/10/2014	22.238	22.621	22.238	19.948	19.758	18.711	20.138	21.569	20.9	n/a
7/11/2014	22.717	23.004	22.333	19.948	19.853	18.711	20.234	21.855	21.1	n/a
7/12/2014	22.429	22.812	22.333	20.138	19.853	18.901	20.615	22.238	21.2	n/a
7/13/2014	23.004	23.004	22.429	20.519	20.138	18.996	20.71	22.046	21.4	n/a
7/14/2014	23.581	23.773	23.196	21.091	21.187	19.662	21.282	22.908	22.1	n/a
7/15/2014	23.1	23.004	23.004	21.091	20.901	19.853	21.473	23.196	22.0	21.2
7/16/2014	23.004	23.484	22.812	20.805	21.091	19.948	21.855	23.196	22.0	21.5
7/17/2014	23.388	23.581	23.004	20.996	21.091	20.043	21.951	23.388	22.2	21.7
7/18/2014	21.951	22.333	21.855	20.138	20.234	19.853	20.805	21.664	21.1	21.7
7/19/2014	22.429	22.717	22.238	20.519	20.234	19.377	20.71	21.951	21.3	21.7
7/20/2014	22.908	23.388	22.812	20.805	20.996	19.948	21.569	23.004	21.9	21.8
7/21/2014	23.581	23.677	22.908	20.71	21.282	19.758	20.805	22.046	21.8	21.8
7/22/2014	22.621	22.621	22.812	20.996	21.569	21.473	22.046	23.292	22.2	21.8
7/23/2014	23.388	23.966	23.388	21.091	22.046	22.429	22.525	23.966	22.8	21.9
7/24/2014	20.329	20.996	20.805	19.948	19.948	20.424	21.091	22.717	20.8	21.7
7/25/2014	20.234	20.805	20.043	18.236	18.711	19.187	19.377	21.282	19.7	21.5
7/26/2014	20.901	21.473	20.805	18.901	19.377	19.758	19.758	21.569	20.3	21.4
7/27/2014	21.76	22.525	21.664	19.758	19.948	20.329	20.329	22.238	21.1	21.3
7/28/2014	21.951	22.429	22.142	20.519	21.282	21.664	21.473	23.196	21.8	21.3
7/29/2014	22.908	23.581	22.525	20.519	21.76	22.333	22.429	24.255	22.5	21.3
7/30/2014	22.812	23.292	22.812	20.615	21.187	21.378	21.473	23.581	22.1	21.2
7/31/2014	22.525	22.621	22.525	20.901	21.76	22.046	21.855	23.869	22.3	21.4
8/1/2014	21.282	21.569	21.091	20.329	21.091	21.664	21.664	23.869	21.6	21.7
8/2/2014	21.664	21.855	21.855	20.138	20.901	21.569	21.282	23.292	21.6	21.9
8/3/2014	21.76	22.046	21.951	20.424	21.091	21.378	21.282	23.388	21.7	21.9
8/4/2014	22.238	22.621	22.046	20.329	21.187	21.855	21.664	23.677	22.0	22.0
8/5/2014	22.429	21.951	21.76	20.329	21.569	22.046	21.664	24.158	22.0	21.9
8/6/2014	22.717	22.812	22.333	20.329	21.473	21.76	21.473	23.966	22.1	21.9
8/7/2014	22.142	22.333	21.855	19.948	21.187	21.664	21.282	23.773	21.8	21.8
8/8/2014	21.187	21.091	20.805	19.567	20.329	20.615	20.615	22.429	20.8	21.7
8/9/2014	20.901	20.996	20.615	18.711	19.948	20.424	20.043	22.429	20.5	21.5
8/10/2014	20.519	20.805	20.519	18.901	19.662	20.234	19.662	22.142	20.3	21.4
8/11/2014	20.996	20.615	20.805	19.472	20.329	20.71	20.234	22.908	20.8	21.2
8/12/2014	20.329	20.329	20.043	19.282	20.424	21.282	20.996	22.621	20.7	21.0
8/13/2014	19.282	19.948	19.948	18.901	19.567	20.138	20.424	22.046	20.0	20.7
8/14/2014	20.805	20.519	20.234	19.282	20.043	19.948	20.234	22.238	20.4	20.5
8/15/2014	18.426	18.806	18.901	18.616	18.901	18.901	19.472	21.187	19.2	21.5
	21.8	**22.0**	**21.7**	**20.0**	**20.7**	**20.7**	**21.0**	**22.9**	**21.4**	**21.5**